George Best Belfast City Airport – 2023 Annual Performance Report

On Compliance with the Requirements of the 2019 Planning Agreement

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1. Introduction

This report has been prepared to meet the requirements of the Planning Agreement (the Agreement) between Belfast City Airport and the Department for Infrastructure (the Department) dated 22 July 2019. Specifically –

Covenant 1.1: To submit the Annual Performance Report by 31st March in each calendar year and within the Annual Performance Report to report on the performance and compliance with the covenants in this Agreement in the preceding calendar year in a form which shall include all the annual reporting requirements contained in this Agreement or as agreed with the Department from time to time and which shall be published on the Company's website.

The report aims to address each of these reporting requirements either directly within the sections of this report or by reference to further reports (or sections of these) which are provided as appendices.

2. Summary of Reporting Requirements

Table 1 summarises the current reporting requirements within the covenants of the Agreement, as understood by Belfast City Airport.

Table 1 – Reporting Requirements

Covenant Reference	Reporting Requirement (summarised)
2.4.2	Written details of every delayed aircraft outside of permitted hours and circumstances for any aircraft during extended hours
2.4.3	Written report of the payments into and out of the Community Fund
6.7.1.1	Noise exposure contours for year x-1* based on actual ATM (air traffic movements) data
6.7.1.2	Forecast noise contours for years x and x+1 based on predicted ATM data
6.7.1.3	Composite graphic superimposing contours for year, x-1, x and x+1
6.7.2	Comparison of the area within the 57 dB $L_{Aeq,\,16h}$ contours for the cases described in 6.7.1.1 and 6.7.1.2 with a 5.2km2 area
6.7.3	Total number of ATM by aircraft type and actual modal split (for year x-1) and assumed modal split (for years x and x+1) for the cases described in 6.7.1.1 and 6.7.1.2
6.7.4	Number of monthly and annual ATM and a comparison against 48,000 in any period of twelve months
6.7.6	The Quota for year x-1 and a comparison against 4,665
6.7.7	Record of movements by aircraft types not permitted to use the Aerodrome in year x-1 (ie to only accept those which meet the requirements of ICAOC Chap 3, Annex 16 and which are not Marginally Compliant Aircraft)
6.7.8	Record of the use by Aircraft of approaches and climb-outs over Belfast Lough in year x-1

6.7.9	Record of ATM within extended hours and fines administered in year x-1
6.7.10	Log of engine ground runs including time & duration for year x-1
6.7.11	Summary of noise complaints received by the Company, the responses given and the actions taken for year x-1
6.7.12	Review of the degree of adherence to any published noise abatement procedures in operation
6.7.13	Information to verify the accuracy and consistency of the operation of the integrated noise and track keeping system
6.7.14	Evaluation of the data reported including a description of any trends and identification of any relevant features of the Aerodrome operation which may have affected the results
6.7.15	Where the results of the comparison described in 6.7.2 show that the area within the 57 dB $LA_{eq,\ 16h}$ contour of 4.68km2 was exceeded in year x-1 or is likely to be exceeded in year x or x+1, submit (and promptly implement) proposed actions to ensure compliance in year x (and report in the subsequent Annual Performance Report)
6.9	In the Annual Performance Report for 2023, provide data showing the percentage of total arrivals in year x-1 that implemented Continuous Descent Approaches and any agreed improvement
6.11	In the Annual Performance Report for 2023, details of the number and type of departing aircraft breaching the departure noise limits (which are to be introduced by 22 July 2020 along with a mechanism to fine breaches of the limits) and a report of payments into and out of the Community Fund in year x-1
6.12.3	Report regarding compliance with the obligation to ensure the availability of fixed electrical ground power (FEGP) (as described in 6.12 and 6.12.1 to 6.12.2.2 in the Agreement) for year x-1 and agreed actions for improvements (if any) in each Annual Performance Report
7	Include a written report on the operation of a noise insulation scheme

*In this report 'year x-1', 'year x' and 'year x+1' refer to 2023, 2024 and 2025, respectively

3. Reports by Requirement

This section provides a report by each requirement – in the order in which these are covered within the Agreement.

2.4.2 Written details of every delayed aircraft outside of permitted hours and circumstances for any aircraft during extended hours

Details of each delayed aircraft are provided at Appendix 1 - *Extensions Log for 2023.*

During 2023 there were 351 flights during extended hours (1.2% of total movements). Of these, 278 were arrivals and 73 were departures. There were 41 instances when extension requests were refused by the Airport. Table 2 summarises the delay causes by International Air Transport Association (IATA) delay code.

Table 2 – Delay Causes

IATA Code[1]	IATA Description	No. (arr)	No. (dep)
3	A/C dispatch	2	
4	A/C handling	1	
9	Scheduled ground time less than declared minimum	1	
5	Ground servicing, aircraft towing	1	
10	Missed slot		1
13	Check-in error, passenger and baggage		1
15	Boarding, discrepancies and paging, missing checked-in passenger	3	
16	PR/Pax convenience/VIP	5	2
17	Catering order, late or incorrect order given to supplier	1	
19	Reduced mobility, boarding / deboarding of passengers with reduced mobility	5	1
31	Aircraft documentation late/inaccurate		1
32	Loading/unloading, bulky, special load, cabin load, lack of loading staff	4	
33	Loading equipment		1
41	Aircraft defects	32	2
44	Lack of spares	1	
46	Aircraft change, for technical reasons	7	1
51	Aircraft damage - flight		2
52	Aircraft damage - ground	1	
55	Auto equipment fail	1	
58	Other automated system		1
61	Flight plan, late completion or change of, flight docs.	1	
62	Operational requirements, fuel, load alteration	1	
64	Flight deck crew shortage	2	
65	Flight deck crew special request	1	
66	Late cabin crew boarding or departure procedures, other than connection and standby		1
67	Cabin crew shortage	1	
71	Weather departure station	1	1
72	Weather at destination	4	
73	Weather en route	1	
75	De-ice/de-snow	2	
77	Ground handling impaired bad weather	2	
81	ATFM due to demand/capacity problems	4	3
82	ATC Staff/Equipment problem	1	1
83	ATFM (air traffic flow management) due to restriction at destination airport, airport and/or runway closed due to obstruction, industrial action, staff shortage, political unrest, noise abatement, night curfew, special flights		4

[1] Whilst Delay Code 1 (as shown in *Appendix 1 – Extensions Log for 2023*) provides the primary description of each delay, where appropriate Delay Code 2 (*as shown in Appendix 1*) has been counted in this table, in order to ensure clarity and provide greater detail on delay causes.

85	Mandatory security		1
87	Airport Facilities	2	
89	Restrictions at airport of departure with or without ATFM restrictions, including air traffic services, start-up and pushback, airport and/or runway closed due to obstruction or weather, industrial action, staff shortage, political unrest, noise abatement,	5	
93	Aircraft rotation, late arrival of aircraft from another flight or previous sector (including weather, aircraft technical issues/damage, security, refuelling delays, crew shortages, ground handling issues, baggage errors, ramp congestion, passengers with reduced mobility)	172	48
96	Operations control	11	1
99	Other reason (not matching other codes)	2	
	Totals	**278**	**73**

2023 saw a reduction in the number of flights during extended hours compared with the previous year (437 flights during extended hours;1.71% of total movements in 2022) as airports worked to address networking issues faced in 2022 as the aviation sector began to recover following the lifting of COVID-19 restrictions.

2.4.3 Written report of the payments into and out of the Community Fund

Table 3 shows the payments into and out of the Community Fund in 2023, including a summary of the types of projects receiving funding. This should be viewed in conjunction with Appendix 3 – *Extension & Departure Noise Charges for 2023*.

Table 3 – Community Fund Payments

	£	£
Payments In		
Extensions Jan-Dec		60,625
Extensions over 480		0
Departure Noise Exceedances		0
Subtotal		60,625
Payments Out		
Local schools support (2 schools)	27,314	
Community education initatives (2 initiatives)	45,227	
Community events/awards (1 event; 1 award)	9,450	
Local sports	1,600	
Local charities/community groups support (2 groups)/En	16,500	
Subtotal		100,091
Balance		**(39,466)**

6.7.1.1 to 6.7.1.3 Noise Exposure Contours

These are discussed in Section 4 and shown in tables 4 to 8 of the report prepared by Bickerdike Allen Partners on behalf of Belfast City Airport, provided at Appendix 2 – *Bickerdike Allen Partners Report 2023.*

6.7.2 Comparison of the area within the 57 dB LAeq, 16h contours for the cases described in 6.7.1.1 and 6.7.1.2 with a 5.2km^2 area

Table 4 shows a comparison of the area within the 57 dB LAeq,16h contour with a 5.2 km^2 area for 2023 with forecasts for 2024 and 2025. Further details are provided in Section 4 of *Bickerdike Allen Partners Report 2023* (Appendix 2).

Table 4 – Area of the 57 dB LAeq,16h contour compared with a 5.2km^2 area

Contour Level (dB $L_{Aeq,16h}$)	Area of Daytime Air Noise Contours (km^2)			Contour Area Limit (km)^2
	2023	2024	2025	
57	2.91	3.61	3.78	5.20

6.7.3 Total number of ATM by aircraft type and actual modal split (for year x-1) and assumed modal split (for years x and x+1) for the cases described in 6.7.1.1 and 6.7.1.2

Total number of ATM by aircraft type for the cases described in 6.7.1.1 and 6.7.1.2 is provided at *Table 1: 2023, 2024 and 2025 Summer Fixed Wing Movements* in Section 2 of *Bickerdike Allen Partners Report 2023* (Appendix 2).

The term 'modal split' refers to the split of movements by runway – at Belfast City Airport this is between Runway 04 (c 040° bearing) and Runway 22 (c 220° bearing). This is generally determined by wind direction as aircraft will take off and land into a headwind to maximise lift - so variation is likely between individual years.

Table 5 shows the actual modal split for 2023 and the long-term average summer modal split for 2019-2023 (the assumed modal split for the cases described in 6.7.1.1 and 6.7.1.2). The actual modal split and the long-term average modal split were used to produce the 2023 contour and the forecast contours respectively, as discussed in Section 3.2 of *Bickerdike Allen Partners Report 2023* (Appendix 2).

Table 5 – 2023 and Long-Term Average Summer Modal Split

Runway	% of Summer Movements			
	2023		2019-2023 Average	
	Arrivals	Departures	Arrivals	Departures
04	32%	36%	34%	38%
22	68%	64%	66%	62%

6.7.4 Number of monthly and annual ATM and a comparison against 48,000 in any period of twelve months

Table 6 shows the monthly ATM in 2022 and 2023 along with the rolling 12-month total from January 2023 onwards – which remained lower than the upper limit of 48,000 movements.

ATM 2022		ATM 2023		Rolling 12 month ATM
Jan-22	1,076	Jan-23	2,483	26,903
Feb-22	1,091	Feb-23	1,949	27,761
Mar-22	1,327	Mar-23	2,170	28,604
Apr-22	1,416	Apr-23	2,373	29,561
May-22	1,846	May-23	2,503	30,218
Jun-22	2,168	Jun-23	2,485	30,535
Jul-22	2,787	Jul-23	2,672	30,420
Aug-22	2,914	Aug-23	2,597	30,103
Sep-22	2,886	Sep-23	2,546	29,763
Oct-22	2,905	Oct-23	2,623	29,481
Nov-22	2,539	Nov-23	2,474	29,416
Dec-22	2,541	Dec-23	2,529	29,404

Table 6 – Rolling 12 Month ATM

6.7.6 The Quota for year x-1 and a comparison against 4,665

The Quota Count total for the Quota Period 2023 was 1,446.5, which is lower than the upper limit of 4,665. Details of how the Quota Count has been calculated are provided in *Table 9: Summer 2023 Quota Count* in Section 5 of *Bickerdike Allen Partners Report 2023* (Appendix 2) including details of how the Quota Count has been calculated.

6.7.7 Record of movements by aircraft types not permitted to use the Aerodrome in year x-1

In 2023 there were no movements of aircraft that do not meet the requirements of ICAOC Chap 3, Annex 16 or are only marginally compliant. Details are provided in Section 6 of *Bickerdike Allen Partners Report 2023* (Appendix 2).

6.7.8 Record of the use by Aircraft of approaches and climb-outs over Belfast Lough in year x-1

The Agreement requires Belfast City Airport to maintain a bias in favour of approaches and climb-outs by aircraft over Belfast Lough (the 'Lough Bias'). Whilst direction of approach/climb-out is generally determined by wind direction, Air Traffic Control aims to maximise additional opportunities to direct aircraft over Belfast Lough (for example during light wind conditions, if safe to do so) ie departure using runway 04 and arrival using runway 22. Table 7 shows the number of arrivals and departures over both the City and Belfast Lough throughout 2023. There were 15,220 movements over the Lough from a total of 29,404 movements. On average over the year 52% of movements were over the Lough, so a bias in favour of arrivals and departures over Belfast Lough was maintained, in compliance with the Agreement.

Table 7 – Arrivals and Departures over the City and Belfast Lough

	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Total
Arrivals over City (04*)	68	198	360	427	673	666	286	464	425	493	295	221	**4,576**
Departures over City (22)	1,134	747	703	690	549	535	1,009	770	771	770	901	1,029	**9,608**
Total over City	*1,202*	*945*	*1,063*	*1,117*	*1,222*	*1,201*	*1,295*	*1,234*	*1,196*	*1,263*	*1,196*	*1,250*	***14,184***
Arrivals over Lough (22)	1,173	775	726	759	578	577	1,050	835	849	819	941	1,044	**10,126**
Departures over Lough (04)	108	229	381	497	703	707	327	528	501	541	337	235	**5,094**
Total over Lough	*1,281*	*1,004*	*1,107*	*1,256*	*1,281*	*1,284*	*1,377*	*1,363*	*1,350*	*1,360*	*1,278*	*1,279*	***15,220***
Total ATMs	2,483	1,949	2,170	2,373	2,503	2,485	2,672	2,597	2,546	2,623	2,474	2,529	**29,404**
Percentage over Lough	52%	52%	51%	53%	51%	52%	52%	52%	53%	52%	52%	51%	**2023 average 52%**

*Runway in use

6.7.9 Record of ATM within extended hours and fines administered in year x-1

Appendix 3 – *Extension & Departure Noise Charges for 2023* provides a record of ATM within extended hours and associated fines administered.

6.7.10 Log of engine ground runs including time & duration for year x-1

Belfast City Airport operates restrictions on engine ground runs. These are prohibited between 22:30 and 06:00 and require prior approval by Airfield Operations, with further restrictions in place according to location and the power level of runs. All engine ground runs in 2023 complied with these requirements. Details of engine ground run requirements are provided in Appendix 4 – *AOI-07 Aircraft Ground*

Running and Use of Auxiliary Power Units and Ground Power Units. A log of engine ground runs is provided at Appendix 5 – *Engine Run Log 2023*.

6.7.11 Summary of noise complaints received by the Company, the responses given and the actions taken for year x-1

A summary of noise concerns logged in 2023 is provided at Appendix 6 – *Noise Concerns Summary 2023*. All noise concerns received are acknowledged upon receipt and responded to by letter, email or telephone within 15 working days.

Various responses are provided according to the nature of the concern lodged. In the case of general queries, information on the procedures and standards applied at the airport will be provided. In the case of concerns relating to specific noise events, the results of investigation will be provided. In the case of concerns relating to movements during extended hours, our response will include reference to the relevant requirements of our Planning Agreement and to the guidance issued by the Department for Infrastructure relating to extensions.

In 2023, 64% of concerns were received from June to September and 42% of the total concerns throughout the year were associated with extended flights. 43% of the total concerns were associated with track keeping. 39% of all concerns were raised by three individuals, with one accounting for 21%. All track keeping concerns are investigated by the Environment Team and action is taken where necessary including dialogue with airlines to ensure effective implementation of the noise abatement procedures in place at the aerodrome.

6.7.12 Review of the degree of adherence to any published noise abatement procedures in operation

Belfast City Airport's noise abatement procedures are published at https://www.aurora.nats.co.uk/htmlAIP/Publications/2020-01-30-AIRAC/html/eAIP/EG-AD-2.EGAC-en-GB.html#AD-2.EGAC. These determine specific paths to be flown by aircraft on departure/arrival to minimise the impact of noise on local populations. 'Track violations' occur when aircraft deviate from these paths. Whilst the incidence of track violations is relatively low, in certain situations adherence to the noise abatement procedures may prove problematic, for example in poor weather conditions. Belfast City Airport reports track violations to Airlines on a monthly basis and maintains dialogue with Airline representatives with the aim of minimising the number of occurrences.

Table 8 summarises the occurrence of track violations in 2023.

Table 8 – Track Violations

Runway	A / D	Number Flights	Number Violations	Percentage
04	D	5094	50	1.0%
04	A	4576	1	0.0%
22	D	9608	10	0.1%
22	A	10126	1	0.0%
TOTAL		29404	62	0.2%

At only 0.2% of all flights, the number of track violations is well below the target level of 5% set out in the Airport's Environmental Noise Directive Noise Action Plan 2019-2023 *(available at https://www.belfastcityairport.com/our-community/environment/noise)*. This is a reduction from 0.33% in 2022.

6.7.13 Information to verify the accuracy and consistency of the operation of the integrated noise and track keeping system

Belfast City Airport operates a Noise & Flight Track Monitoring System which provides ongoing data on aircraft movements including noise levels and tracks flown. An ongoing maintenance and support contract has been in place with Topsonic Systemhaus GmbH since 2007 when the system was installed. This includes daily system checks by Topsonic (further details are available on request). Third-party calibration of microphones and monitoring equipment is conducted on a two-yearly basis. A record of current equipment calibration status is provided at Appendix 7 – *Calibration Records 2023.*

In August 2023, due to the forthcoming closure of Kinnegar Logistics Base, the Airport's noise monitoring terminal situated within the Base was relocated to the adjoining Reserve Forces' and Cadets' Associations' (RFCA) facility. This followed a period of study to assess the suitability of the new location, conducted in consultation with the Department. At the same time, equipment upgrades were made to both this and the Airport's other noise monitoring terminal situated at Nettlefield Primary School.

In 2023, radar maintenance took place over a period of 46 days in total – over the following periods:

20 Jan – 21 Jan (2 days)

24 Apr – 27 Apr (4 days)

13 Jun – 19 Jun (7 days)

17 Jul – 21 Jul (5 days)

15 Aug – 16 Aug (2 days)

21 Sep – 23 Sep (3 days)

02 Oct – 04 Oct (3 days)

12 Dec – 31 Dec (20 days).

During these periods a substitute radar feed was provided by the nearby Crow Hill installation and the Noise & Flight Track Monitoring System continued to record data on flight movements and noise events.

6.7.14 Evaluation of the data reported including a description of any trends and identification of any relevant features of the Aerodrome operation which may have affected the results

Belfast City Airport has fully complied with the requirements of the Agreement during 2023.

The Airport has continued to provide bi-monthly performance reports to the Department since the Agreement came into effect in July 2019, including details of delayed aircraft using the aerodrome outside permitted hours (06:30 to 21:30) and the circumstances for any aircraft using the aerodrome during extended hours (21:31 to 23:59). The following summarises key data and trends:

- In 2023, movements totalled 29,404 compared with 25,496 in 2022.
- In 2023, delayed flights after 21:30 constituted only 1.18% of all movements compared with 1.71% in 2022).
- In 2023, 63% of delays after 21:30 were due to the late arrival of aircraft from another flight or previous sector (compared with 79% in 2022).
- The size of the 57 dB LAeq, 16h noise contour area in 2023 was 2.91 km^2, an increase of 0.3 km^2 from 2.61 km^2 in 2022. This can be attributed to a change in fleet mix, with an increase in the use of passenger jets.
- The Quota Count total for summer 2023 was 1,446.5 – a decrease from 1,640.88 in 2022, remaining lower than the 2019 total of 2,216.375.
- On average, 78% of arrivals in 2023 implemented CDA compared with 87% in 2022.

6.7.15 Where the results of the comparison described in 6.7.2 show that the area within the 57 dB LAeq, 16h contour of 4.68km2 was exceeded in year x-1 or is likely to be exceeded in year x or x+1, submit (and promptly implement) proposed actions to ensure compliance in year x (and report in the subsequent Annual Performance Report)

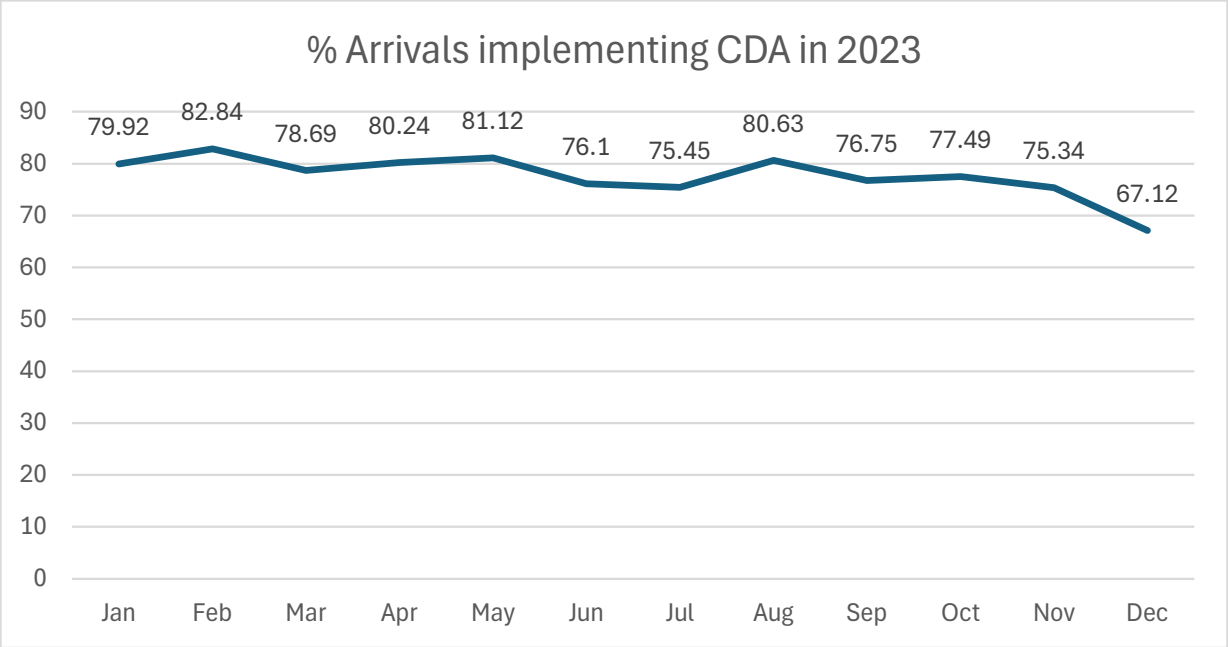
The area within the 57 dB LAeq, 16h contour of 4.68km2 was not exceeded in 2023 and is not forecasted to be exceeded in years 2023 or 2024. The areas of the 2023 contour and forecasted 2024 and 2025 contours are shown in Table 4 (above).

6.9 In the Annual Performance Report for 2023, provide data showing the percentage of total arrivals in year x-1 that implemented Continuous Descent Approaches and any agreed improvement

Continuous Descent Approach (CDA) is an operating technique in which arriving aircraft follow a constant-angle descent (rather than a series of steps) in order to reduce noise and fuel consumption.

The chart below shows the percentage of arrivals implementing Continuous Descent Approaches by month. On average, 78% of arrivals in 2023 implemented CDA (down from 87% in 2022). Variation in CDA performance is due to a range of factors including weather, air traffic conditions and crew experience.

Subject to safety constraints and the operational requirements of individual aircraft, the Airport will continue to maximise implementation of CDA.



Data provided by NATS (Air Traffic Control provider at Belfast City Airport)

6.11 In the Annual Performance Report for 2023, details of the number and type of departing aircraft breaching the departure noise limits and a report of payments into and out of the Community Fund in year x-1

The following departure noise limits are in place at Belfast City Airport: 83 dB LAsmax for aircraft departing towards the city and 87 dB LAsmax for aircraft departing towards Belfast Lough (as measured by the Airport's noise monitoring terminals). Any breaches of these noise limits will be identified through the Airport's Noise and Track Monitoring System. During 2023, there were no breaches of the departure noise limit.

6.12.3 Report regarding compliance with the obligation to ensure the availability of fixed electrical ground power (FEGP) (as described in 6.12 and 6.12.1 to 6.12.2.2 in the Agreement) for year x-1 and agreed actions for improvements (if any) in each Annual Performance Report

All stands at Belfast City Airport are equipped with FEGP. In 2023, 98% of flights overall used FEGP (compared with 97% in 2022). Occasions when FEGP was not used were due to the following: aircraft parked in non-standard position due to weather (whilst operational and available for use at the stand, FEGP in these cases could not be reached due to aircraft orientation) or parked in remote locations for operational reasons; and minor power outages.

FEGP at Belfast City Airport is subject to an ongoing maintenance regime aimed at achieving maximum serviceability.

7 Include a written report on the operation of a noise insulation scheme

At present, no residential dwellings are affected by the level of noise at which a noise insulation scheme must be implemented (ie as defined by the 63 dB LAeq, 16h contour). For this reason, the scheme is not yet operating.

4. Appendices

Appendix 1 - *Extensions Log for 2023*

Appendix 2 – *Bickerdike Allen Partners Report 2023*

Appendix 3 – *Extension & Departure Noise Charges for 2023*

Appendix 4 – *AOI-07 Aircraft Ground Running and Use of Auxiliary Power Units and Ground Power Units*

Appendix 5 – *Engine Run Log 2023*

Appendix 6 – *Noise Concerns Summary 2023*

Appendix 7 – *Calibration Records 2023*

Date	Airline Code	Sch. Time	Actual Time	Delay Time (mins)	Arr / Dep	Registration	Flight #	Airport	Runway	Delay code 1	Description 1	Delay code 2	Description 2	Comments
1-Jan-23	EZY	20:55	21:46	51	D	GEZUP	654	LPL		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector	41	A/C TECH THEN SWOPPED AT LPL	
2-Jan-23	BE	21:15	21:34	19	A	GJECY	628	NCL		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector		ATC restricions in NCL due sickness	
4-Jan-23	BE	21:00	21:35	35	D	GFLBB	41P	BHX		96	OPERATIONS CONTROL, re-routing, diversion, consolidation, aircraft change for reasons other than technical			
5-Jan-23	BE	19:50	22:19	149	A	GECOR	974	LHR		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector		react due to earlier tech issues and aircraft changes	
6-Jan-23	BE	20:30	21:42	72	D	GJECY	419	BHX		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector		react due to operational aircraft changes due to tech issues	
6-Jan-23	EI	21:15			A	EIFSK	3629	GLA			REFUSED OUTSIDE OPERATING HOURS			
12-Jan-23	EI	20:30	21:50	80	A	EIGPN	3649	BHX		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector	32	ops control grounded fleet temporarily due tech issue	
12-Jan-23	EI	21:00	22:03	63	A	EIGPP	3619	MAN		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector	32	ops control grounded fleet temporarily due tech issue	
12-Jan-23	EI	21:15	21:46	31	A	EIFSK	3629	GLA		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector	32	ops control grounded fleet temporarily due tech issue	
19-Jan-23	EI	21:15	21:36	21	A	GCMJM	3629	GLA		65	FLIGHT DECK CREW SPECIAL REQUEST. not within operational requirements	93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector	
20-Jan-23	EI	21:00	22:44	104	A	EIGPO	3619	MAN		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector			
22-Jan-22	EI	21:05	22:19	74	A	GEUYM	937	LHR		3	A/C dispatch	87	AIRPORT FACILITIES, parking stands, ramp congestion, lighting, buildings, gate limitations, etc.	
22-Jan-23	EZY	20:25	21:39	74	A	GUZHT	653	LPL		44	Reactionary	39	De-Ice/De-Snow	
22-Jan-23	EZY	20:55	22:24	89	D	GUZHT	654	LPL		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector			
25-Jan-23	BA	20:35	21:33	58	A	GEUUA	1422	LHR		93	REAC due a/c being deiced in LHR			
25-Jan-23	EI	21:05	22:12	67	A	GEUUG	937	LHR		93	REAC due a/c being deiced in LHR		aircraft changes due to tech issues	
27-Jan-23	BA	20:40	21:32	52	A	GLCYR	8758	LCY		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector			
30-Jan-23	BA	18:35	21:36	181	A	GMIDO	1420	LHR		93	LIAC, due a/c swap and crew change			
30-Jan-23	BA	19:15	22:31	196	D	GMIDO	1421	LHR		93	LIAC, due a/c swap and crew change			
5-Feb-23	EI	21:15	22:32	77	A	GCMJL	3629	GLA		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector			
8-Feb-23	EI	21:05	22:10	65	A	GEUUR	937	LHR		93	AIRCRAFT ROTATION / DELAYS EARLIER IN LONDON DUE WEATHER (FOG)			
13-Feb-23	EI	21:05	22:12	67	A	GEUUE	937	LHR		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector		react delay due to an earlier aircraft change at LHR due to tech issues	
17-Feb-23	EI	19:10	21:37	147	D	EIGPN	3628	GLA		93	AIRCRAFT ROTATION - LATE DUE SEVERAL TECH ISSUES EARLIER IN DAY			
17-Feb-23	EI	21:10	21:45	35	A	GCMJL	3659	EDI		93	AIRCRAFT ROTATION - LATE DUE SEVERAL TECH ISSUES EARLIER IN DAY			
17-Feb-23	EI	21:00			A	EIHDJ	3619	MAN			REFUSED AS OUTSIDE OPERATING HOURS			
17-Feb-23	EI	21:15			A	EIGPN	3629	GLA			REFUSED AS OUTSIDE OPERATING HOURS			
19-Feb-23	EZY	20:55	22:20	85	D	GEZUR	654	LPL		93	AIRCRAFT ROTATION / TECH AIRCRAFT AT LPL /AIRCRAFT SWOP			
26-Feb-23	LM	19:20			A	GSAJC	573	MME			Refused as outside operating hours / Loganair wanted to operate the flight to arrive at 2235 and the position to ABZ so was refused and flight			
8-Mar-23	BA	20:40	22:18	98	A	GLCYN	8758	LCY		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector		react due to earlier weather issues at LCY (snow) + a tech delay ex LCY	
8-Mar-23	EI	21:10			D	EIHDJ	404P	DUB			refused as this was a positioning flight and would have departed after 2130			
9-Mar-23	EI	21:15			A		3629	GLA			REFUSED AS OUTSIDE OPERATING HOURS			
9-Mar-23	EI	21:00			A		3619	MAN			REFUSED AS OUTSIDE OPERATING HOURS			
10-Mar-23	EI	21:15	21:52	37	A	GCMJN	3629	GLA		93	ONGOING DELAYS DUE WX ISSUES / AIRCRAFT NOT IN CORRECT BASE DUE WX THUR NIGHT			
10-Mar-23	EI	21:10			A		3659	EDI			REFUSED AS OUTSIDE OPERATING HOURS			
10-Mar-23	EI	20:30			A		3649	BHX			REFUSED AS OUTSIDE OPERATING HOURS			
11-Mar-23	BA	19:05	22:02	177	A	GEUYY	1420	LHR		93	AIRCRAFT RTN TO STAND AFTER TAKEOFF AT LHR DUE MEDICAL EMERGENCY - PAX TOOK HEART ATTACK			
11-Mar-23	EZY	20:30	21:41	71	D	GEZTD	704	LGW		93	AIRCRAFT LATE ON PREVIOUS SECTOR FROM GVA INTO LGW			
12-Mar-23	EZY	20:55	21:52	57	D	GUZLA	654	LPL		93	AIRCRAFT LATE ON PREVIOUS SECTOR FROM GVA INTO LPL			
13-Mar-23	EI	21:00	22:00	60	A	EIGPO	3619	MAN		93/46	A/C SWOP & late handling in MAN			
13-Mar-23	EI	21:15	22:58	103	A	EIGPP	3629	GLA		93/46	A/C tech BHD			
13-Mar-23	EI	21:10	21:56	46	A	EIGPN	3659	EDI		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector		due to earlier tech problems	
14-Mar-23	EI	21:15	21:32	17	A	EIHDH	3629	GLA		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector		due to earlier tech problems	
16-Mar-23	EI	20:30	21:43	73	A	GCMJM	3649	BHX		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector		due to earlier tech problems	
16-Mar-23	EI	21:00	21:38	38	A	EIHDH	3619	MAN		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector		due to earlier tech problems	
16-Mar-23	EI	19:10	21:47	157	D	GCMJN	3628	GLA		85	Two PAX removed from flight by security	93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector	
16-Mar-23	EI	21:15			A	GCMJN	3629	GLA			REFUSED AS OUTSIDE OPERATING HOURS			
20-Mar-23	EI	20:25	22:03	98	A	GCMJN	3679	LBA		93	LATE ARRIVAL DUE EARLIER TECH ISSUE			
21-Mar-23	EI	21:00			A		3619	MAN			REFUSED AS OUTSIDE OPERATING HOURS / DIVERTED TO BFS			
25-Mar-23	EZY	20:30	21:54	84	D	GEZRX	704	LGW		93/58	LIAC & boarding discrepancy here			
26-Mar-23	EZY	20:45	22:06	81	D	GEZUL	804	LGW		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector			
29-Mar-23	EI	21:15	22:02	47	A	GCMJN	3629	GLA		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector			
30-Mar-23	EI	21:15	21:54	39	A	GCMJL	3629	GLA		93	AIRCRAFT ROTATION / EARLIER TECH ISSUE		react due to earlier maintenance carried out at BHD before the previous sector	
31-Mar-23	EZY	20:45	21:41	56	D	GEZAJ	804	LGW		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector			
31-Mar-23	EI	20:30	21:42	72	A	GCMJJ	3649	BHX		4	A/C handling			
1-Apr-23	EZY	19:45			A	GEZBJ	803	LGW			Refused outside operating hours for Departure therefore requested extension to 22.00hrs cancelled 21:40 after it was decided inbound flight would divert to BFS and go back out from there.			
1-Apr-23	EZY	20:15			D	GEZBJ	804	LGW						
2-Apr-23	EZY	20:15	21:47	92	A	GEZTB	803	LGW		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector	5	Aircraft towing	41 - Aircraft Defects
2-Apr-23	EZY	20:45	22:38	113	D	GEZTB	804	LGW		66	LATE CABIN CREW BOARDING OR DEPARTURE PROCEDURES, other than connec	93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector	
5-Apr-23	EZY	20:45	22:14	89	D	GUZLD	804	LGW		51	A/C defect due bird strike on approach			
6-Apr-23	EZY	20:45	21:55	70	D	GEZTA	804	LGW		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector			
7-Apr-23	EI	21:00	21:35	35	A	GCMJN	3619	MAN		93/16	react delay + delay awaiting the diables assistance company attending for an ad hoc wchr in MAN			
7-Apr-23	EI	21:15	22:57	102	A	GCMJM	3629	GLA		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector		react due to tech issues and aircraft changes	
9-Apr-23	EI	20:30	21:42	72	A	GCMMK	3649	BHX		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector		react due to an earlier tech delay at BHD	
11-Apr-23	EI	20:25	21:35	70	A	GCMJM	3679	LBA		93	AIRCRAFT ROTATION / EARLIER TECH ISSUES			
11-Apr-23	EI	21:10	21:32	22	A	EIGZV	3659	EDI		93	AIRCRAFT ROTATION / EARLIER TECH ISSUES			
11-Apr-23	EI	20:30	22:05	95	A	GCMMK	3649	BHX		93	AIRCRAFT ROTATION / EARLIER TECH ISSUES			
12-Apr-23	EI	20:15			A	GUZHW	803	LGW			DIVERTED TO BFS - TECH ISSUE			
		20:45			D	GUZHW	804	LGW			2230 CALLED BUT THEN REFUSED AS WOULD BE OVER OUR OPERATING HOURS			
13-Apr-23	EZY	20:15	21:38	83	A	GEZTT	803	LGW		93	flights in and out of LGW slow due to traffice management			
13-Apr-23	BA	20:50	22:16	86	A	GEUYB	1426	LHR		93	LIAC / aircraft delayed on a previous route		LIAC / aircraft delayed on a previous route	
13-Apr-23	EZY	20:45	22:29	104	D	GEZTT	804	LGW		93	LIAC		Slot delay in LGW	
19-Apr-23	EI	21:10	21:40	30	A	GCMJJ	3659	EDI		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector		due a security delay on a previous sector	
24-Apr-23	EZY	20:50	21:32	42	D	GEZGY	6570	LGW		93	LIAC		LIAC from previous sector	
25-Apr-23	EZY	20:40	21:53	73	D	GEJCV	804	LGW		51	Bird strike on landing			
28-Apr-23	EI	20:40	21:38	58	A	GCMJM	3605	SOU		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector		earlier tech issue	
28-Apr-23	BA	20:25	22:46	141	A	GEUYU	1426	LHR		41	AIRCRAFT DEFECTS.		wheel change required at LHR	
30-Apr-23	EI	21:00	21:56	56	A	GCMJN	3619	MAN		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector			
1-May-22	EZY	20:50	22:02	72	D	GEZOP	6570	LGW		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector		Slot previously in dav	
9-May-23	EZY	20:05	21:42	97	A	GEZDR	803	LGW		89	RESTRICTIONS AT AIRPORT OF DEPARTURE WITH OR WITHOUT ATFM RESTRICTIONS, including Air Traffic Services, start-up and pushback, airport and/or runway closed due to obstruction or weather, industrial action, staff shortage, politcal unrest, noise abatement, night curfew, special flights		thunderstorm activity	
9-May-23	EZY	20:45	22:23	98	D	GEZDR	804	LGW		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector		as per above	
9-May-23	BA	20:50	21:55	65	A	GEUYI	1426	LHR		89	RESTRICTIONS AT AIRPORT OF DEPARTURE WITH OR WITHOUT ATFM RESTRICTIONS, including Air Traffic Services, start-up and pushback, airport and/or runway closed due to obstruction or weather, industrial action, staff shortage, politcal unrest, noise abatement, night curfew, special flights		thunderstorm activity	
11-May-23	EI	20:30	22:21	111	A	GCMMN	3649	BHX		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector	41	ROOT CAUSE DUE TECH A/C FOR EI3676	
12-May-23	EI	20:30	22:09	99	A	GCMMK	3649	BHX		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector	96	ROOT CAUSE AIRCRAFT SWAP EARLIER IN DAY	
14-May-23	EI	20:40	22:27	107	A	GCMMN	3605	SOU		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector	41	ROOT CAUSE DUE TECH A/C FOR EI3688	
15-May-23	EZY	20:50	21:50	60	D	GEJCE	6570	LGW		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector			
15-May-23	EI	21:15	22:09	54	A	GCMJJ	3629	GLA		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector			
16-May-23	EI	20:25	21:41	76	A	GCMMN	3679	LBA		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector	41	CREW REQUESTED A LAST MINUTE CHECK	

Date	Airline Code	Sch. Time	Actual Time	Delay Time (mins)	Arr / Dep	Registration	Flight#	Airport	Runway	Delay code 1	Description 1	Delay code 2	Description 2	Comments
17-May-23	EI	17:40	21:38	238	A	GCMMK	3657	EDI		41	AIRCRAFT DEFECTS.			
17-May-23	EI	21:15			A	GCMJN	3629	GLA			REFUSED DUE LIKELY OUTSIDE OPERATING HOURS. DIVERTED TO BFS			
18-May-23	EI	21:15	21:40	25	A	GCMMK	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to tech issues and aircraft changes	
18-May-23	EI	20:30	21:35	65	A	GCMMN	3649	BHX		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to tech issues and aircraft changes	
19-May-23	EI	20:40	21:34	54	A	GCMMK	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
21-May-23	EI	21:00	21:56	56	A	GCMJM	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to earlier tech issues	
21-May-23	EI	21:15	21:31	16	A	GCMJL	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to earlier tech issues	
21-May-23	EZY	20:45	21:37	52	D	GEZDM	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to ATC delay on a previous sector	
23-May-23	EI	20:30	21:36	66	A	GCMJJ	3649	BHX		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	96	ROOT CAUSE DUE A/C SWAP ONTO INBOUND EI3615	
24-May-23	EI	21:15	22:32	77	A	GCMJJ	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	96	ROOT CAUSE DUE A/C SWAP DUE TECH A/C	
24-May-23	EI	20:40	21:37	57	A	GCMJN	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	96	ROOT CAUSE DUE A/C SWAP DUE TECH A/C	
26-May-23	EI	21:00	21:49	49	A	GCMJM	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to earlier tech issues	
26-May-23	EZY	20:45	21:46	61	D	GEZAY	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		late in due delay on earlier sector. then slot delay	
27-May-23	EZY	19:30	21:34	124	A	GEZBW	803	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		crew change in LGW	
27-May-23	EZY	20:15	22:15	120	D	GEZBW	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		crew change in LGW	
28-May-23	EI	20:40	22:03	83	A	GCMMK	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to earlier tech issues	
28-May-23	EI	21:15	21:57	42	A	GCMJL	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to earlier tech issues	
				0										
2-Jun-23	EZY	20:45	21:49	64	D	GEZBY	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	82	SLOT RESTRICTON TO LGW	
3-Jun-23	EZY	20:15			D	GEZBA	804	LGW			CANCELLED AT 21:15 AS WOULD NOT MAKE CURFEW. INBOUND DIV TO BFS			
4-Jun-23	EI	21:10	21:32	22	A	GCMJL	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			NO MVT RECEIVED AT TIME ENTERED
5-Jun-23	EI	21:15	22:08	53	A	GCMJL	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	16	Pax convenience on earlier sector	
6-Jun-23	EZY	20:05			A		803	LGW			refused as likely to go outside operating hours. cancelled			
6-Jun-23	EZY	20:45			D		804	LGW			refused as likely to go outside operating hours. cancelled			
9-Jun-23	BA	20:20	22:01	101	A	GLCAF	8757	LCY		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
9-Jun-23	BA	20:25	22:18	113	D	GEUXE	1425	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
9-Jun-23	EZY	20:55	21:32	37	D	GEZDA	21:32	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
9-Jun-23	EI	21:15	21:48	33	A	GCMJL	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
11-Jun-23	EZY	20:05			A	GEZBR	803	LGW			refused as the delay was going outside our operating hours			
11-Jun-23	EZY	20:45			D	GEZBR	804	LGW			refused as the delay was going outside our operating hours			
11-Jun-23	EI	21:00	21:31	31	A	GCMJL	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		+ loading an electric mobility aid	
12-Jun-23	EI	21:00	22:09	69	A	GCMJN	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		late refuelling in MAN due incident at airport	
12-Jun-23	BA	20:50	22:22	92	A	GEUUM	1426	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		ROOT CAUSE DUE BAD SLOT EX LHR DUE WX	
14-Jun-23	EI	20:45			A	GCMJM	3659	LBA		41	DIV TO BFS AS WOULD NOT MAKE CURFEW		2 Wheels reqiured changing	
14-Jun-23	EI	20:40	21:50	70	A	GCMJL	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	96	A/C swap due ops	SOU swapped onto inbound BHX due a/c avail
14-Jun-23	BA	19:45	21:58	133	D	GEUPZ	1425	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	81	ATC SLOT	Slots due to Nats/eurocontrol outage
14-Jun-23	EZY	20:45	22:11	86	D	GEZAG	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	81	ATC SLOT	Slots due to Nats/eurocontrol outage
15-Jun-23	EI	20:30	22:18	108	A	GCMMK	3649	BHX		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	81	ATC SLOTS	
15-Jun-23	EI	21:00	22:45	105	A	GCMJN	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	81	ATC SLOTS	
16-Jun-23	BA	20:50	22:07	77	A	GEUYU	1426	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	81	ATC SLOTS	
16-Jun-23	EI	21:00	22:01	61	A	GCMJM	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	96	ROOT CAUSE AIRCRAFT SWAP EARLIER IN DAY	
18-Jun-23	EI	21:00	21:32	32	A	GCMMN	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
18-Jun-23	EI	21:10			A	GCMJN	3659	EDI			weather. but diverted it as not making curfew			
19-Jun-23	EI	17:00			A	GCMJJ	3647	BHX			refused as the delay was going outside our operating hours			
19-Jun-23	EI	20:30	22:17	107	A	GCMJN	3649	BHX		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
21-Jun-23	EI	21:10	21:31	21	A	GCMMK	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
21-Jun-23	EZY	20:45	22:04	79	D	GEZDV	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
22-Jun-23	EI	21:00	21:57	57	A	GCMJN	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to earlier ATC delays	
22-Jun-23	EZY	20:45	21:40	55	D	GEZFI	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	46	ROOT CAUSE A/C SWAP DUE TECH	
23-Jun-23	EZY	20:30	21:31	61	D	GEZGN	473	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
23-Jun-23	EI	20:30	21:56	86	A	GCMJL	3649	BHX		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	96	ROOT CAUSE AWAITING A/C TO POS FROM EXT	
23-Jun-23	EI	20:40	21:44	64	A	GCMMK	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	15	SWP shortage in SOU 15/0016	
23-Jun-23	EI	21:10	21:52	42	A	GCMJM	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			late prm earlier in day in MAN
23-Jun-23	EI	21:15	22:00	45	A	GCMMN	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			Runway closure earlier in NCL / Cot also dept late on EI3628 cooling cabin down due no aircon
25-Jun-23	EZY	20:45			D	GEJCH	804	LGW			DIV TO BFS AS WOULD NOT MAKE CURFEW		ATC SLOTS	
25-Jun-23	EI	21:00	22:18	78	A	GCMJM	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	19	awaiting prm in EDI on EI3657	
25-Jun-23	EI	20:40	21:45	65	A	GCMMN	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	96	previous a/c swap	
25-Jun-23	EI	21:10	21:33	23	A	GCMJN	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
26-Jun-23	EI	21:00	21:43	43	A	GCMJL	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	61		
26-Jun-23	EZY	20:50	22:23	93	D	GUZHT	6570	LGW		10	Missed slot			
27-Jun-23	LM	18:55	21:57	182	A	GSAJI	161	INV		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		due earlier tech issues	
27-Jun-23	LM	19:25	22:38	193	D	GSAJI	162	INV		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		due earlier tech issues	
27-Jun-23	EZY	20:50	22:00	70	A	GEZDN	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		delay in earlier sector	
27-Jun-23	EI	21:00	22:46	106	A	GCMMK	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		a/c delayed earlier sector due ATC issues in IOM	
27-Jun-23	EI	21:10		-1270	A	GCMJM	3659	EDI			DIV TO BFS AS WOULD NOT MAKE CURFEW			
28-Jun-23	EI	21:00	21:37	37	A	GCMJL	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		slow turnaround on earlier sector 9other station)	
28-Jun-23	EI	21:10	21:56	46	A	GCMJM	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	96	A/C diverted last night due curfew, late repositioning this morning	
29-Jun-23	EI	20:40	21:45	65	A	GCMJJ	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	52	A/C rts due tech issue	
29-Jun-23	EZY	20:45	21:53	68	D	GEZFI	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	81	Previous ATC slots during day	Further delayed due to manual boarding and M/F/I headcount onboard
30-Jun-23	EI	20:40	21:39	59	A	GCMJN	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
30-Jun-23	EI	20:30	21:46	76	A	GCMJL	3649	BHX		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
30-Jun-23	EZY	20:40	21:51	71	D	GEZWU	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
1-Jul-23	EZY	20:50	21:47	57	A	GEZBT	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		earlier ATC delays	
1-Jul-23	BA	20:55	21:37	42	A	GLCAG	4534	PMI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		earlier catering issue at BHD	
2-Jul-23	BA	20:50	21:31	41	A	GEUPO	1426	LHR		99	A baggage handler at LHR sufferred a head injury so flight delayed whilst medics called		a baggage handler sufferred a head injury at LHR	
2-Jul-23	EI	21:15	21:36	21	A	GCMMN	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to an earlier tech issue	
2-Jul-23	EI	21:10	21:56	46	A	GCMJN	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to an earlier tech issue	
2-Jul-23	EZY	20:50	22:07	77	A	GEZBA	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to earlier ATC delays	
3-Jul-23	EZY	20:50	22:03	73	D	GEJCK	6570	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
3-Jul-23	EI	20:40	21:36	56	A	GCMMK	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
6-Jul-23	EI	21:00	22:06	66	A	GCMMN	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		due earlier tech issues	
7-Jul-23	EI	20:30	21:33	63	A	GCMJM	3649	BHX		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
7-Jul-23	EI	20:40	21:50	70	A	GCMJJ	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	17	ops issue a/c overweight in SOU	
7-Jul-23	EZY	20:50	22:28	98	A	GEZGK	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		LIAC FROM A PREVIOUS SECTOR INTO LGW	
8-Jul-23	EZY	20:50	22:44	114	A	GEZBA	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		LIAC FROM A PREVIOUS SECTOR INTO LGW	
9-Jul-23	EZY	20:40	21:42	62	D	GEZWZ	646	LTN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		LIAC FROM A PREVIOUS SECTOR INTO MAN THEN BHD	
10-Jul-23	EZY	20:50	22:12	82	A	GEZDD	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		LIAC FROM A PREVIOUS SECTOR INTO LGW	
10-Jul-23	EI	21:10	21:42	32	A	GCMJJ	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		ATC SLOT EX EDI	
10-Jul-23	EI	21:15	21:38	23	A	GCMMK	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		ATC SLOT EX GLA	
13-Jul-23	EI	21:15	21:38	23	A	GCMMN	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
13-Jul-23	EZY	20:50	21:55	65	A	GEZFT	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
13-Jul-23	EZY	20:45	22:02	77	D	GEZDY	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
14-Jul-23	EI	20:25	22:11	106	A	GCMJM	3679	LBA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
14-Jul-23	EI	20:40	21:59	79	A	GCMMK	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
14-Jul-23	EI	21:00	22:50	110	A	GCMJL	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
14-Jul-23	EI	21:10	22:17	67	A	GCMJN	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
14-Jul-23	EZY	20:50	22:24	94	A	GEZBX	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
14-Jul-23	BA	20:25	21:35	70	D	GTTNC	1425	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
16-Jul-23	EI	21:00	21:46	46	A	GCMJN	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
16-Jul-23	EI	21:10	21:40	30	A	GCMMN	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		HANDLING ISSUE AT EDI	

Date	Airline Code	Sch Time	Actual Time	Delay Time (mins)	Arr / Dep	Registration	Flight #	Airport	Runway	Delay code 1	Description 1	Delay code 2	Description 2	Comments
16-Jul-23	BACF	21:15	22:01	46	A	GLCYU	8758	LCY		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	TECH ISSUE / AIRCRAFT SWOP	
16-Jul-23	EZY	20:50	21:42	52	A	GEZBT	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
17-Jul-23	BA	20:50	21:54	64	A	GTTNN	1426	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
17-Jul-23	EZY	20:50	22:09	79	D	GEZOM	6570	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		LIAC FROM A PREVIOUS SECTOR INTO LGW	
18-Jul-23	EI	20:30	21:56	86	A	GCMJJ	3649	BHX		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	TECH ISSUE EARLIER AT BHD, A/C RTN TO STAND	
18-Jul-23	EZY	20:50	21:52	62	A	GEZDK	803	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		LIAC FROM A PREVIOUS SECTOR INTO LGW	
21-Jul-23	EZY	20:40	21:56	76	D	GEZIY	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	83	DEPT SLOT BACK TO LGW (22:02L)	
23-Jul-23	EZY	20:05	21:43	98	A	GEZDV	803	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	81	ATC SLOT DEPT	
23-Jul-23	EZY	20:50	22:38	108	D	GEZDV	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	83	ATC dept slot 22:43L	
23-Jul-23	EZY	20:50	21:31	41	A	GEZGE	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
24-Jul-23	EZY	20:50	22:05	75	A	GEZDI	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		ATC Staffing issues	
25-Jul-23	EI	20:40	21:34	54	A	GCMJM	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
25-Jul-23	EZY	20:50	22:17	87	A	GEZGJ	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
25-Jul-23	EZY	20:45	22:21	96	D	GUZHV	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		ATC SLOTS INTO LGW WAS 2349L THEN 2242L THEN CANX AT 2209	
26-Jul-23	EI	21:15	22:08	53	A	GCMJM	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		TECH ISSUE ON EARLIER SECTOR	
27-Jul-23	EZY	20:50	21:46	56	A	GEZAI	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
27-Jul-23	EZY	20:45	22:25	100	D	GEZTY	804	LGW		83	ATFM due to RESTRICTION AT DESTINATION AIRPORT. airport and/or runway closed due to obstruction. industrial action. staff shortage.		Incident at LGW resulted in ATC evaculation at approx 2100. ATC re-opened at 2120 and holding aircraft prioritised then slots reveiwed, explained unable to accommodate 2320 departure sl	
29-Jul-23	BA	20:50	21:31	41	A	GEUYE	1426	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
29-Jul-23	EZY	20:50	21:44	54	A	GEZBV	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
30-Jul-23	EZY	20:45	21:32	47	D	GEZDI	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
30-Jul-23	EI	20:40	21:55	75	A	GCMJM	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		BIRD STRIKE ON EARLIER SECTOR	
31-Jul-23	EZY	20:50	21:53	63	A	GEZDD	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		HANDLING ISSUES / LACK OF HANDLERS AT LGW	
31-Jul-23	EZY	20:50	21:57	67	D	GUJEB	6570	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		Late inbound due to traffic flow control at LGW	
1-Aug-23	EI	21:15	22:30	75	A	GCMJJ	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		AIRCRAFT DELAYED EARLIER SECTOR DUE WHEEL CHANGE REQUIRED	
2-Aug-23	EZY	20:50	22:14	84	A	GEZBZ	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		ATC RESTRICTIONS WEATHER ISSUES	
2-Aug-23	EI	21:15	22:09	54	A	GCMJL	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		AIRCRAFT DIVERTED ON EARLIER SECTOR WEATHER ISSUES	
2-Aug-23	BA	20:50	21:33	43	A	GEUUM	1426	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		ATC RESTRICTIONS WEATHER ISSUES	
3-Aug-23	EA	20:45	21:49	64	A	GCMMK	102P	EXT		99	Request for extension for positioning flight refused - Aircraft landed anyway as accepted by ATC			
3-Aug-23	EI	20:25	21:53	88	A	GCMMN	3679	LBA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
4-Aug-23	EZY	20:50	21:39	49	A	GEZDD	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	03	Late boarding release due automated systems issues	
5-Aug-23	BA	20:50	21:45	55	A	GEUUS	1426	LHR		87	AIRPORT FACILITIES, parking stands, ramp congestion, lighting, buildings, gate limitations, etc.			
6-Aug-23	EI	20:25	21:41	76	A	GCMJJ	3679	LBA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		Aircraft had a flat tyre	
6-Aug-23	EZY	20:50	21:37	47	A	GEZFT	893	LGW		89	RESTRICTIONS AT AIRPORT OF DEPARTURE WITH OR WITHOUT ATFM RESTRI	31	AIRCRAFT DOCUMENTATION LATE/INACCURATE, weight and balance, general declaration, pax manifest, etc.	
6-Aug-23	EZY	20:05			A	GEZDM	803	LGW			Aircraft diverted to BFS due to increasing delays			
6-Aug-23	EZY	20:45			D	GEZDM	804	LGW			Flight cancelled due to increasing delays, departure could not happen before 22:45			
7-Aug-23	EZY	20:50	22:04	74	D	GUZHR	6570	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	33	Late loading of bags in LGW 33/0057	
8-Aug-23	EI	21:10	21:46	36	A	GCMMK	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	Aircraft originally tech in BHD and operated the MAN rotation	
10-Aug-23	EI	21:00	21:43	43	A	GCMJM	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
10-Aug-23	EI	20:40	21:48	68	A	GCMJN	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	SEVERAL TECH ISSUES	
10-Aug-23	EI	20:25	22:34	129	A	GCMMK	3679	LBA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	SEVERAL TECH ISSUES	
11-Aug-23	EI	20:25	21:37	72	A	GCMMK	3679	LBA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
11-Aug-23	EI	20:40	21:42	62	A	GCMJM	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	EARLIER TECH ISSUES	
12-Aug-23	EI	19:05	22:21	196	A	GCMJJ	3615	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
13-Aug-23	EI	21:15	22:29	74	A	GCMJN	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	TECH ISSUES THRU DAY	
14-Aug-23	EI	20:25			A	EIFAT	3679	LBA			aircraft diverted to BFS as it was then to position to DUB and the timing was outside our limit of 2130			
14-Aug-23	EI	21:00			P	EIFAT	402P	DUB			aircraft was to position to DUB but the time was after 2130 so refused			
14-Aug-23	EZY	20:50	21:35	45	D	GEJCK	6570	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		ground handling delay ex LGW	
16-Aug-23	EZY	20:50	21:55	65	A	GEZBY	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due an earlier runway closure at LGW	
16-Aug-23	EI	21:00	21:39	39	A	GCMJJ	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	62	react due to operational reasons on a previous sector	
17-Aug-23	EI	20:40	21:41	61	A	GCMJJ	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	tech issue previously in EMA and back in BHD	
17-Aug-23	EZY	20:45	21:46	61	D	GEZDK	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	31	lack of dispatcher in LGW and previous LIAC	
18-Aug-23	EI	21:10	21:34	24	A	GCMJN	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			Root cause FD awaiting paperwork for EI3658 62/0029
19-Aug-23	BA	20:50			A	GLCYZ	4534	PMI			A/c DIV to BFS due to ETA outside 2300L. Previous delays on PMI			
19-Aug-23	EI	19:35	21:36	121	A	GCMJM	3681	EMA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		Previous tech issue during day and disruptive pax offloaded on EXT	
19-Aug-23	EI	19:20	21:56	156	A	GCMMK	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		Several tech issues and swaps throughout day and a/c operated extra sectors	
20-Aug-23	BA	21:15	21:37	22	A	GLCAE	8758	LCY		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			root cause due issues with ambilift in LCY
20-Aug-23	EZY	20:50	21:50	60	A	GEZAW	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		Previous ATC slot on AC and ground handling issues in LGW	
20-Aug-23	EI	21:00	21:32	32	A	GCMJL	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		Built up of delays throughout the day including Crew clearances and changes	
21-Aug-23	EI	20:30	22:47	137	A	GCMJM	3649	BHX		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41/16	Tech issues and slow boarding on earlier sectors	
21-Aug-23	EI	21:10	22:29	79	A	GCMMN	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	tech issues earlier sector	
21-Aug-23	EI	21:15	22:20	65	A	GCMJJ	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41/19	tech issues & PRM	
24-Aug-23	EZY	20:05			A	GEZFT	803	LGW			diverted to BFS as the departure would have been outside our operational hours			
24-Aug-23	EZY	20:45			D	GEZFT	804	LGW			diverted to BFS as the departure would have been outside our operational hours			
24-Aug-23	EZY	20:50	21:48	58	A	GEZAY	893	LGW		71	ATC delays at LGW due to thunderstorm activity			
25-Aug-23	EI	21:15	21:32	17	A	GCMJN	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		earlier tech issues	
25-Aug-23	EZY	20:40	21:41	61	D	GEZRZ	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		awaiting cabin crew in LGW	
26-Aug-23	EZY	20:50	21:31	41	A	GEZBY	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		earlier tech issues	
26-Aug-23	EI	19:20	22:33	193	A	GCMMN	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		earlier tech issues and aircraft changes	
26-Aug-23	EI	19:05	22:41	216	A	GCMJJ	3615	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		earlier tech issues and aircraft changes	
27-Aug-23	EI	20:30	21:35	65	A	GCMMK	3649	BHX		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		earlier tech issues and aircraft changes	
27-Aug-23	EI	21:00	21:54	54	A	GCMJN	3619	MAN		93	28-Aug-23		earlier tech issues and aircraft changes	
27-Aug-23	EZY	20:50	21:40	50	A	GEZBJ	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		earlier ATC delay at LGW	
28-Aug-23	EI	17:35	21:42	247	D	GCMJN	3678	LBA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		ONGOING DISRUPTION DUE ATC FLIGHT PLAN FAILURE	
28-Aug-23	EZY	20:50	22:08	78	A	GEZAX	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		ONGOING DISRUPTION DUE ATC FLIGHT PLAN FAILURE	
28-Aug-23	EI	21:00	23:47	167	A	GCMJL	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		ONGOING DISRUPTION DUE ATC FLIGHT PLAN FAILURE	
28-Aug-23	EI	21:15	23:12	117	A	GCMMN	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		ONGOING DISRUPTION DUE ATC FLIGHT PLAN FAILURE	
28-Aug-23	EI	20:30	23:09	159	A	GCMJJ	3649	BHX		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		ONGOING DISRUPTION DUE ATC FLIGHT PLAN FAILURE	
28-Aug-23	EI	20:40	23:39	179	A	GCMMK	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		ONGOING DISRUPTION DUE ATC FLIGHT PLAN FAILURE	
28-Aug-23	EI				A	GCMJN	3679	LBA			diverted to bfs due over our curfew - eta bfs approx 0015			
29-Aug-23	BA	20:50	21:48	58	A	GTTNP	1426	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	64	Awaiting for FO arriving from inbound flight into LHR	
29-Aug-23	EI	21:15	21:59	44	A	GCMJN	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
29-Aug-23	EI	21:00	21:40	40	A	GCMMK	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	96	A/c swap previously in day	
31-Aug-23	EZY	20:45	22:13	88	D	GEZGE	804	LGW		16	COMMERCIAL PUBLICITY/PASSENGER CONVENIENCE, VIP, press, ground meals and missing personal items			Due disruptive passenger onboard. Awaiting for police to question passenger and crew
31-Aug-23	EI	21:00	21:50	50	A	GCMMN	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	PREVIOUS TECH ISSUE DURING THE DAY	
1-Sep-23	BA	20:25	22:06	101	D	GEUYO	1425	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	13	Baggage discrepency at gate	
1-Sep-23	EZY	20:50	22:13	83	A	GEZDR	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		earlier ATC delay at LGW and LIAc from previous sectors	
2-Sep-23	EZY	20:50	21:50	60	A	GEZAG	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		earlier tech issues at LGW	
4-Sep-23	EZY	20:50	22:22	92	D	GUZHI	6570	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		ATC slots earlier in day	Bird stike on dept LGW and Slot ex BHD of 22:21L
4-Sep-23	EZY	20:50	21:43	53	A	GEZBT	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		ATC slots earlier in day	
7-Sep-23	EI	20:40	21:55	75	A	GCMMN	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			WX ISSUES ON EARLIER SECTOR TO EDI
8-Sep-23	EZY	20:45	21:32	47	D	GEZGN	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
8-Sep-23	EI	21:00	21:36	36	A	GCMJL	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	MULTIPLE TECH ISSUES THRU AFTERNOON	
8-Sep-23	EI	21:15	22:14	59	A	GCMJJ	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41		
8-Sep-23	EI	20:40	22:11	91	A	GCMMN	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41		
8-Sep-23	EI	20:25	22:41	136	A	GCMJM	3679	LBA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41		
10-Sep-23	EI	20:30	22:00	90	A	GCMMK	3649	BHX		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	TECH / AIRCRAFT SWOPS	
11-Sep-23	EZY	20:50	21:38	48	D	GUZHJ	6570	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		due to earlier ATC delays at LGW	
13-Sep-23	EZY	20:50	22:00	70	A	GEZBB	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		due to ATC delays at LGW	
14-Sep-23	EZY	20:45	21:56	71	D	GEZBF	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	83	ATC slot for ARR a/c into LGW	
15-Sep-23	EZY	20:00	21:50	110	A	GEZDA	472	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			BHX-GLA sector delayed in BHX due delayed ground handling

Date	Airline Code	Sch. Time	Actual Time	Delay Time (mins)	Arr / Dep	Registration	Flight #	Airport	Runway	Delay code 1	Description 1	Delay code 2	Description 2	Comments
15-Sep-23	EZY	20:30	22:38	128	D	GEZDA	473	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			BHX-GLA sector delayed in BHX due delayed ground handling
15-Sep-23	EZY	20:45	21:48	63	D	GEZAO	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			ATC slot res in LGW
15-Sep-23	EI	21:00	22:13	73	A	GCMMK	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			Previous tech issue on EI3618
17-Sep-23	EZY	19:35	21:34	119	A	GEZGG	261	BRS		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			earlier ATC delays
17-Sep-23	EZY	20:05	22:15	130	D	GEZGG	262	BRS		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			Issues earlier in day with ASU
17-Sep-23	EI	21:00	22:03	63	A	GCMJM	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			Issue earlier in day on EI3623 GLA with baggage
17-Sep-23	BA	21:20	21:37	17	A	GLCAF	8758	LCY		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
18-Sep-23	EZY	20:50	21:49	59	A	GEZDJ	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	64		FLT CREW HOURS
18-Sep-23	BA	19:30	21:53	143	D	GEUYY	1425	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	71	WX earlier in LHR	
19-Sep-23	EI	21:00	21:34	34	A	GCMMN	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
20-Sep-23	EZY	20:50	21:50	60	A	GEZBB	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		WX ISSUE ACROSS SOUTH OF ENGLAND	
21-Sep-23	EZY	20:05			A	GEZDH	803	LGW			diverting to BFS due to delay going outside our curfew for the return flight (EZ7804) as per	below		
21-Sep-23	EZY	20:45			D	GEZDH	804	LGW			extension refused as going outside our curfew for the departure - flight cancelled			
21-Sep-23	EZY	20:50	22:47	117	A	GEZBF	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		due to earlier ATC delays (thunderstorms)	
21-Sep-23	BA	20:50	21:53	63	A	GEUUY	1426	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		due to earlier ATC delays (thunderstorms)	
22-Sep-23	EZY	20:45	22:03	78	D	GEZDJ	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		due to earlier ATC delays at LGW	
23-Sep-23	EZY	20:50			A	GEZBY	893	LGW			extension refused as eta very close to our curfew - flight was then to divert to BFS but later	was cancelled		
24-Sep-23	EI	21:10	22:27	77	A	GCMJN	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to adverse weather conditions	
24-Sep-23	EI	21:15	21:47	32	A	GCMJM	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to adverse weather conditions	
25-Sep-23	EI	21:00	21:34	34	A	GCMJL	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	EARLIER TECH ISSUES / AIRCRAFT SWOPS	
27-Sep-23	EI	20:40	22:16	96	A	GCMMT	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		WX ISSUES - STORM AGNES	
27-Sep-23	EI	21:15	21:47	32	A	GCMJN	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		WX ISSUES - STORM AGNES	
28-Sep-23	EZY	20:50	21:33	43	A	GEZBR	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	82		
1-Oct-23	BA	20:50	21:51	61	A	GEUPO	1426	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	15	Boarding discrepancy in LHR	
1-Oct-23	EI	21:10	21:34	24	A	GCMMT	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	87	Airport facilities/staffing in EDI	
2-Oct-23	BA	19:30	22:20	170	D	GEUPG	1425	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to adverse weather conditions	
2-Oct-23	BA	14:40	21:46	426	A	GEUYO	1416	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to adverse weather conditions	
2-Oct-23	BA	15:30	22:35	425	D	GEUYO	1417	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to adverse weather conditions	
3-Oct-23	EI	20:30	21:58	88	A	GCMMK	3649	BHX		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		A/C swap due tech aircraft in MAN	
4-Oct-23	EI	21:15	22:05	50	A	GCMMN	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due earlier tech issues	
6-Oct-23	EI	20:40	21:35	55	A	GCMJN	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41		
9-Oct-23	EI	20:40			A	GCMJL	3605	SOU			extension refused as eta very close to our curfew - flight diverted to BFS			
9-Oct-23	EI	20:25	21:48	83	A	GCMMK	3679	LBA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		earlier GPS issues for Emerald	
9-Oct-23	EI	20:30	21:43	73	A	GCMJJ	3649	BHX		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		earlier GPS issues for Emerald	
9-Oct-23	EI	21:10	21:35	25	A	GCMMT	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		earlier GPS issues for Emerald	
12-Oct-23	BA	20:50	21:44	54	A	GEUOF	1426	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	9	slow turnaround in LHR	
13-Oct-23	EZY	20:50			A	GEZBR	893	LGW			EXT REFUSED - FLIGHT DIVERTED TO BFS			
13-Oct-23	BA	20:50	21:35	45	A	GEUYO	1426	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	16		
15-Oct-23	EZY	20:45	22:04	79	D	GEZBU	804	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		earlier ATC delays	
15-Oct-23	EZY	20:50	21:40	50	A	GEZDJ	893	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		earlier ATC delays	
18-Oct-23	BA	20:50	22:50	120	A	GEUOE	1426	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	a/c rtn to stand in LHR tech, a/c swap	
20-Oct-23	EI	21:15	21:34	19	A	GCMJL	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	67	CABIN CREW SHORTAGE	
20-Oct-23	EI	21:00	21:38	38	A	GCMMN	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
23-Oct-23	EZY	20:50	21:35	45	D	GEZTC	6570	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	19	Due DL19/0028 Ex LGW awaiting PRM	
23-Oct-23	EI	20:25	21:33	68	A	GCMJL	3679	LBA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	72	Late dept from BHD on 3678 waiting for WX to improve in LBA	
24-Oct-23	EI	20:40	21:32	52	A	GCMJN	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	55	DL55/0034. due boarding system failure at gate. manual reconciling require	
26-Oct-23	EI	20:40	21:51	71	A	GCMJJ	3605	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	16	pax convenience	
27-Oct-23	EI	20:30	22:19	109	A	GCMJJ	3649	BHX		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	96	ops issue	
27-Oct-23	EI	21:00	21:35	35	A	GCMJM	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	19	awaiting prm pax	
27-Oct-23	EI	21:10	22:09	59	A	GCMMN	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	89	ATC slot	
27-Oct-23	EI	21:15	22:15	60	A	GCMJL	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	earlier tech issues	
29-Oct-23	EI	18:45	21:41	176	A	GCMJJ	3647	BHX		41	AIRCRAFT DEFECTS.			
29-Oct-23	EZY	20:35	21:45	70	A	GEZBB	805	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		earlier ATC slot delays at LGW	
29-Oct-23	EZY	20:50	21:43	53	D	GEZBZ	644	LTN		16	due to a medical issue a passenger had to be offloaded from the flight			
30-Oct-23	EI	21:15	22:09	54	A	GCMJN	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	46	a/c swap due earlier tech a/c	
31-Oct-23	EI	21:00	21:57	57	A	GCMMN	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to earlier tech issues and aircraft changes	
31-Oct-23	EI	21:15	22:39	84	A	GCMJN	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to earlier tech issues and aircraft changes	
3-Nov-23	EZY	20:35	21:33	58	A	GUZHB	805	LGW		46	AIRCRAFT CHANGE, for technical reasons.		the original aircraft made an emergency landing at LGW on the previous sector so was out of service	
3-Nov-23	EI	20:25	22:43	138	A	GCMMK	3679	LBA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		due to earlier tech issues and aircraft changes	
3-Nov-23	EI	21:15			A	GCMJL	3629	GLA			diverted to BFS as eta was after our curfew time of 2300			
6-Nov-23	BA	20:35	21:32	57	A	GEUYY	1422	LHR		15	BOARDING, discrepancies and paging, missing checked-in passenger			
7-Nov-23	BA	20:25	21:40	75	A	GLCYU	8758	LCY		46	AIRCRAFT CHANGE, for technical reasons.			
12-Nov-23	EI	21:15	22:13	58	A	GCMMN	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	Tech issue on outbound EI3628	
13-Nov-23	BA	20:35	21:43	68	A	GTTOB	1422	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	72	ealier wx delays	
13-Nov-23	EI	21:00	21:59	59	A	GCMJM	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	72	ealier wx delays	
13-Nov-23	EI	21:15	21:50	35	A	GCMJN	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	72	ealier wx delays	
15-Nov-23	EI	21:10	21:45	35	A	GCMMK	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	46	dept from BHD rtn to stand tech/aircraft swap	
19-Nov-23	BA	20:35	21:37	62	A	GDBCK	1422	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due earlier ATC staff shortages at LHR	
19-Nov-23	BA	19:30	21:58	148	A	GTTNR	1420	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due earlier ATC staff shortages at LHR	
19-Nov-23	BA	20:30	22:45	135	D	GTTNR	1421	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due earlier ATC staff shortages at LHR	
20-Nov-23	EI	21:15	21:38	23	A	GCMMN	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	19	awaiting ambilift at Gla	
23-Nov-23	EI	21:10	21:31	21	A	GCMJJ	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
26-Nov-23	EI	21:15	22:40	85	A	GCMJL	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	TECH ISSUE ON EARLIER FLT	
30-Nov-23	EI	21:15	21:51	36	A	GCMJL	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	75	due to a refuelling delay on a previous sector + deicing delay ex GLA	
30-Nov-23	EI	21:10	21:54	44	A	GCMJN	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	75	react due earlier tech issue + deicing delay at EDI	
1-Dec-23	EI	21:10	21:52	42	A	GCMJL	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
1-Dec-23	BA	20:45	21:40	55	A	GDBCA	1422	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
1-Dec-23	EA	20:45			A	GCMMN	301P	LPL			the aircraft operating EI3648 to BHX had diverted to LPL due to fog at BHX - the aircraft was then to position empty to BHD but the eta was after 2130 so the aircraft was diverted to BFS			
3-Dec-23	BA	20:35	21:36	61	A	GEUYT	1422	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
3-Dec-23	EI	20:30	21:50	80	A	GCMJN	3649	BHX		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to earlier weather issues	
3-Dec-23	EI	21:15	21:32	17	A	GCMJL	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due to earlier weather issues	
3-Dec-23	EZY	20:50	21:44	54	D	GUZLA	644	LTN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		LATE RQST FOR DEICING	
4-Dec-23	EI	21:00	21:35	35	A	GCMJL	3689	EMA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector		react due an earlier tech delay	
6-Dec-23	EI	20:40	21:33	53	A	GCMJM	3607	SOU		41	AIRCRAFT DEFECTS.			
10-Dec-23	EI	21:10	22:46	96	A	GCMMK	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	Tech issue, aircraft returned to stand due fault	
10-Dec-23	EZY	20:35	21:51	76	A	GEZTJ	805	LGW		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
12-Dec-23	EI	21:15	21:33	18	A	GCMJM	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
13-Dec-23	EI	21:15	21:37	22	A	GCMJJ	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	41	TECH ISSUE	
20-Dec-23	EI	21:15	21:33	18	A	GCMMT	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
21-Dec-23	BA	19:30	22:22	172	D	GDBCC	1421	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
21-Dec-23	BA	20:35	21:34	59	A	GEUOF	1422	LHR		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	32, 87	Loading/unload , Airport Facilities	
21-Dec-23	EI	21:10	22:07	57	A	GCMMT	3659	EDI		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
21-Dec-23	EI	21:00	21:57	57	A	GCMMK	3619	MAN		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	89,16,19	ATC/GRND Control. PR/VIP. Reduced Mobility	
21-Dec-23	EI	21:15	22:51	96	A	GCMJN	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	19	Reduced Mobility	
21-Dec-23	EI	20:40	22:47	127	A	GCMMN	3607	SOU		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	16	PR/Pax convenience/VIP	
22-Dec-23	EI	21:15	21:38	23	A	GCMMK	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	73		

Date	Airline Code	Sch. Time	Actual Time	Delay Time (mins)	Arr / Dep	Registration	Flight#	Airport	Runway	Delay code 1	Description 1	Delay code 2	Description 2	Comments
22-Dec-23	EI	20:30	21:49	79	A	GCMMN	3649	BHX		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector			
27-Dec-23	EI	21:15	21:39	24	A	GCMJL	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
28-Dec-23	EI	21:15	21:46	31	A	GCMMK	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector	77	BAD WX/VISABILITY AT GLA	
28-Dec-23	EI	21:00	22:14	74	A	GCMJN	3689	EMA		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector	19	ACCOMMADATING REDUCED MOBILITY PAX AT EMA	
28-Dec-23	EI	21:10	22:44	94	A	GCMMT	3659	EDI		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector	77	BAD WX / VISIBILITY AT EDI / THUNDERSTORMS	
29-Dec-23	EZY	20:35	22:04	89	A	GEZDD	805	LGW		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector			
29-Dec-23	EZY	15:45	22:13	388	D	GEZGN	232	BRS		41	TECH ISSUE - ALTERNATIVE AIRCRAFT FLOWN IN TO OPERATE			
30-Dec-23	EI	21:15	21:35	20	A	GCMJL	3629	GLA		93	AIRCRAFT ROTATION. late arrival of aircraft from another flight or previous sector			
30-Dec-23	EZY	20:35	21:45	70	A	GEZDR	805	LGW		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector	46	AIRCRAFT CHANGE DUE TECH ISSUE	
31-Dec-23	EZY	20:35	22:15	100	A	GEZOX	805	LGW		93	AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector			

Entries in red indcate where requests for extensions were refused by Belfast City Airport.

Bickerdike
Allen
Partners
Architecture
Acoustics
Technology

GEORGE BEST BELFAST CITY AIRPORT

2023 ANNUAL REPORT

Report to

George Best Belfast City Airport
Sydenham By-Pass
Belfast
BT3 9JH

A11298_14_RP009_3.0
07 June 2024

121 Salusbury Road
London NW6 6RG
T 020 7625 4411
F 020 7625 0250
mail@bickerdikeallen.com
www.bickerdikeallen.com

Bickerdike Allen Partners LLP is an integrated practice of Architects, Acousticians, and Construction Technologists, celebrating over 60 years of continuous practice.

Architects: Design and project management services which cover all stages of design, from feasibility and planning through to construction on site and completion.

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7.0 Summary 16

Figures

A11298_14_DR001 Figure 01 Initial Departure Routes

A11298_14_DR002 Figure 02 Summer Daytime Noise Contours – 2023

A11298_14_DR003 Figure 03 Summer Daytime Noise Contours – 2024 Forecast

A11298_14_DR004 Figure 04 Summer Daytime Noise Contours – 2025 Forecast

A11298_14_DR005 Figure 05 Comparison of 2023, 2024 and 2025 57 dB $L_{Aeq,16h}$ Noise Contours

Appendices

Appendix 1: Glossary of Acoustic Terminology

Appendix 2: George Best Belfast City Airport 2023 Noise Contour Validation

1.0 INTRODUCTION

The planning agreement[1] between Belfast City Airport Limited (BCA) and the Department for Infrastructure dated 22 July 2019 sets out regular reporting that the airport is required to make. The required reporting includes an Annual Performance Report (APR) which is to be submitted annually on 31 March. The content of the APR is detailed in paragraphs 6.7.1 to 6.7.15 of *PART II The Covenants* of the agreement.

Bickerdike Allen Partners LLP (BAP) have been retained by George Best Belfast City Airport (GBBCA) to produce some of the information required for the APR, specifically the information related to the following paragraphs:

- 6.7.1 Noise exposure contours
- 6.7.2 Comparison of noise contour areas
- 6.7.3 Air traffic movements the contours are based on
- 6.7.6 The Quota Count for the previous year
- 6.7.7 A record of movements by aircraft types not permitted to use the airport in the previous year (those only marginally compliant with Chapter 3)
- 6.7.14 (Partial) An evaluation of the data reported, specifically that we are preparing.

Noise contours have been produced for 2023 based on the actual aircraft movements over the 92 day summer period, and for 2024 and 2025 based on forecasts provided by GBBCA. All of the noise contours have been produced using the Federal Aviation Administration's prediction software, the Integrated Noise Model (INM) version 7.0d. This methodology has been validated for the key aircraft types operating at the airport, using results from the Noise Monitoring Terminals (NMTs) installed at GBBCA.

Section 2 of this report gives details of the air traffic movements used to produce the noise contours. Section 3 gives details of the methodology used to produce the noise contours. Section 4 reports the areas of the noise contours and compares them with the 57 dB $L_{Aeq,16h}$ noise contour area limit. Population counts for the key noise exposure contours are also provided. Section 5 reports the results of the quota count assessment for 2023. Section 6 gives details of movements in 2023 by aircraft types that were only marginally compliant with Chapter 3.

[1] Agreement Pursuant to Section 77(1)(a) of the Planning Act (Northern Ireland) 2011

A glossary of acoustic terms can be found in Appendix 1 and Appendix 2 contains details of BAP's noise contour validation exercise.

2.0 AIRCRAFT MOVEMENTS

The basis for the 2023 noise contours are the actual movements during the 92 day summer period, 16 June to 15 September inclusive. Detailed information was provided by GBBCA for all aircraft movements during this period. Although a small proportion of movements occur early in the morning between 6:30 and 7:00 or late in the evening between 23:00 and 00:00 over the 92 day period, for the production of the noise contours all movements have been modelled as taking place within the "daytime period" of 07:00 to 23:00.

The actual movements in 2023 include 23 movements by helicopters. Historically helicopters have not been modelled at GBBCA, as they typically comprise less than 1% of the total movements, and this was also the case in 2023. Their continued omission is not considered significant to the overall contours due to their small number of movements and this maintains consistency with previous contouring.

Compared to 2022, there has been a decrease in movements from 8,223 to 7,779 in 2023, which is also less than the 9,745 movements that occurred in 2019 before the COVID-19 pandemic.

Forecasts of summer movements have been provided for 2024 and 2025. Total summer movements are forecast to increase to 9,514 in 2024, with a further increase to 9,992 movements forecast for 2025. The forecasts include an allowance for general aviation (GA) movements, without specifying particular aircraft types. These movements have been modelled based on the GA types which operated in summer 2023.

The INM software includes noise information for many common aircraft types, but as with all noise modelling software, it does not include every aircraft type. This means that substitutions are required, where an alternative aircraft type is used to model the actual type. For larger aircraft this generally does not involve a change but for the smaller types, and in particular the general aviation aircraft, substitutions occur. Where INM has no guidance, an aircraft type has been assigned based on the aircraft size and engine details. Table 1 below shows the aircraft movements by aircraft type in summer 2023 and those forecast for 2024 and 2025. It also includes the INM type used for each aircraft type in the modelling. "n/a" is shown where a type performed fewer than 10 movements or for the forecast movements was not specifically included in the forecast. Movements by these types have been grouped under "other."

Aircraft Type	INM Type(s)	Summer Fixed Wing Movements		
		2023 Actual	2024 Forecast	2025 Forecast
Airbus A319ceo	A319-131[(1)]	1,220	894	934
Airbus A320ceo	A320-211[(1)]	696	1,503	1,509
Airbus A320neo	A320-211[(1)]	308	523	530
Airbus A321neo	A320-211[(1)]	n/a	16	18
ATR 42	DO328	138	142	142
ATR 72	DO328/DHC6[(1)]	4,313	5,115	5,432
Beechcraft Super King Air	CNA441	14	n/a	n/a
Bombardier Challenger 600	CL600	12	n/a	n/a
Cessna Citation Excel	CNA560XL	24	n/a	n/a
Diamond DA-42	BEC58P	10	n/a	n/a
Embraer E145	EMB145	88	158	158
Embraer E175	EMB175/737500	118	n/a	n/a
Embraer E190	EMB190[(1)]	673	838	928
Embraer E195-E2	EMB195	10	n/a	n/a
Embraer Phenom 300	CNA510	20	n/a	n/a
Pilatus PC-12	CNA208	10	n/a	n/a
Saab 340	SF340	12	n/a	n/a
Other (less than 10 movements)	Various	113	327	343
Total[(2)]		**7,779**	**9,514**	**9,992**

[(1)] INM type modified based on results of a validation exercise.

[(2)] Forecast totals may not match due to rounding.

Table 1: 2023, 2024 and 2025 Summer Fixed Wing Movements

3.0 NOISE CONTOUR METHODOLOGY

3.1 General

The aircraft movement data, provided by GBBCA, has been assessed in relation to aircraft type, departure and arrival route, flight profiles and runway usage to enable input into the noise computation program, the Integrated Noise Model (INM). This section of the report describes how this information has been compiled in a form suitable for analysis purposes.

3.2 Runway Usage

The overall split of movements by runway during the 2023 summer period is given in Table 2, and is compared with the long term average (2019-2023). For the 2023 actual contours, the actual runway usage for each individual movement was used. For the 2024 and 2025 forecast contours the long term average modal split has been used.

Runway	% of Summer Movements			
	2023		2019-2023 Average	
	Arrivals	Departures	Arrivals	Departures
04	32%	36%	34%	38%
22	68%	64%	66%	62%

Table 2: 2023 and Long Term Average Summer Modal Split

The usage of the runways is dependent on the direction of the wind, therefore some variation is to be expected between individual years. Compared to the long term average there was around 2% less usage of runway 04 by both arrivals and departures in 2023, with corresponding increases in the usage of runway 22.

3.3 Flight Tracks

For each runway there is a single modelled arrival route, which follows the runway centreline. There is one modelled initial departure route on runway 22, but four modelled initial departure routes on runway 04.

A validation exercise was undertaken in 2011 to validate the flight tracks used in the INM software. The details of this exercise are shown in Appendix B of the BAP report Ref: A9443-R01-NW dated November 2011. The resulting main departure tracks are shown in Figure 01 and have been used for the contours as there have been no changes to the published routes since 2011.

The method of determining the split of aircraft between the routes from runway 04 takes into account both aircraft type and destination. Where the destination is in Scotland or in Northern Europe (Iceland, Norway, etc.) the initial route heading in a north easterly direction is used. The remaining traffic is split amongst the three routes which turn south. The particular route depends on the distance at which the aircraft type involved is expected to have achieved one of a set of specific altitudes, as required by the airport's noise abatement procedures. These altitudes are 1,500 ft for small propeller aircraft (maximum takeoff weight of up to 13,000 kg); 2,000 ft for large propeller aircraft; and 3,000 ft for jet aircraft.

For the forecast runway 04 departures, the long-term average (2019-2023) split between the north easterly and southerly routes has been used. This results in 18% of departures using the north easterly route, with the remainder using the southerly routes. Aircraft have been split between the three southerly routes according to weight and type, as was done for the actual contours.

3.4 Dispersion

Aircraft on departure are allocated a departure route to follow. In practice, this route is not followed precisely by all aircraft. To allow for this the INM software was used to generate a mean track for each of the five initially distinct routes, and these mean tracks were then dispersed as described below.

The dispersion model has the common assumption that there are five "dispersed" tracks associated with each departure route; these comprise the mean track of each route and two sub-tracks either side, as the actual pattern of departing aircraft is dispersed about the route's centreline. The degree of dispersion is normally a function of the distance travelled by an aircraft along the route after take-off and also on the form of the route.

When considering many departures, it is commonly found that the spread of aircraft approximates to a "normal distribution" pattern. A simplified mathematical model can be adopted to represent a normal distribution of events, based on standard deviations. The five "dispersed" tracks used to model each departure route comprise the main track of each route and two sub-tracks either side. The resulting allocation of movements to each track is as follows:

- 53.3% departures along the main track;
- 22.2% departures split equally along two inner sub tracks either side of the main track and offset by a distance of 1.355 standard deviations;
- 1.15% departures split equally along two outer sub tracks either side of the main track and offset by a distance of 2.71 standard deviations.

This dispersion model has been used in the INM software, which generates the sub-tracks with distances supplied by the user. The distances and percentages used have been determined by BAP from analysis of similar activity at other airports.

3.5 Flight Profiles

For departure movements the INM software offers a number of standard flight profiles for most aircraft types, particularly for the larger aircraft types. These relate to different departure weights which are greatly affected by the length of the flight, and consequently the fuel load. In the INM software this is referred to as the stage length. The stage length increases in increments of 500 nmi up to 1,500 nmi and then in increments of 1,000 nmi. As the stage length increases, the aircraft has to depart with greater fuel, and so its flight profile is slightly lower than when a shorter stage length is flown.

For the 2023 contours, destination airports were given with the actual movements. Stage lengths have been assigned, where INM offers the option, based on the distance of these airports from GBBCA.

For the forecast 2024 and 2025 contours stage lengths have been assigned based on information provided by GBBCA. Where no information is available, such as for general aviation flights, movements have been modelled as stage length 1, which in most cases is the only option available in the INM for the aircraft type.

3.6 INM Model

All contours and population counts have been determined using the Integrated Noise Model (INM) version 7.0d software. GBBCA data relevant to the INM study is taken from the latest edition of the UK Aeronautical Information Package. A 3.0° approach angle has been used for all aircraft and the ground topography has been assumed to be flat. The INM default headwind of 14.8 km/h has been assumed.

Results from the airport's Noise Monitoring Terminals (NMTs) from the period September 2022 to September 2023 have been used in the 2023 validation exercise to review the INM assumptions for the key aircraft types operating at GBBCA.

The 2023 validation exercise included reviewing seven key aircraft types, to best model their operations at GBBCA. The result is that the modelled noise characteristics of some of these aircraft have been adjusted by modifying the INM aircraft used and/or the noise level of the INM aircraft types as necessary. Where modifications have been made to the noise levels, this has been by applying a factor to the number of movements. These adjustments are detailed in Table 3 below.

Aircraft Type	Default INM Type	Modification to INM Assumptions	
		Arrivals	Departures
Airbus A319ceo	A319-131	A319-131 × 0.7	A319-131 × 1.2
Airbus A320ceo	A320-211	A320-211 × 0.8	A320-211 × 1.0
Airbus A320neo	-	A320-211 × 0.6	A320-211 x 0.4
ATR 72	DO328	DO328 × 0.6	DHC6 × 1.0
Bombardier Dash 8	-	SD330 × 1.1	DHC6 x 0.5
Embraer E175	EMB175	EMB175 × 1.1	737500 x 1.2
Embraer E190	EMB190	EMB190 × 1.0	EMB190 × 1.8

Table 3: Modifications to INM Assumptions Used for the Contours

Some changes have been made to the modifications compared to those used for the 2022 contours. In particular, the Airbus A320ceo has been factored down on arrival, whereas the ATR 72 and Embraer E175 have been factored up on arrival. The Embraer E175 has also been factored up on departure. Full details of the 2023 validation exercise are given in Appendix 2.

4.0 NOISE CONTOURS

Noise contours for 2023, 2024 and 2025 in terms of the $L_{Aeq,16h}$ metric have been produced for the 16 hour daytime period, 07:00 to 23:00; although they also include the movements that occur between 06:30 and 07:00 and the small number that occurred between 23:00 and 00:00. They are based on the actual movements for the 92 day summer period in 2023 and the forecasts provided for 2024 and 2025 as detailed in Section 2. The areas of the noise contours are given in Table 4, where they are compared with the 57 dB $L_{Aeq,16h}$ contour area limit.

The 2023 actual, 2024 forecast and 2025 forecast noise contours are shown in Figures 02, 03 and 04 respectively at values from 54 to 69 dB $L_{Aeq,16h}$ in 3 dB steps. The 57 dB contours for all three years are compared in Figure 05.

Contour Level (dB $L_{Aeq,16h}$)	Area of Daytime Air Noise Contours (km^2)			Contour Area Limit $(km)^2$
	2023	2024	2025	
54	5.57	6.79	7.08	-
57	2.91	3.61	3.78	5.20
60	1.52	1.87	1.96	-
63	0.85	1.04	1.08	-
66	0.50	0.60	0.62	-
69	0.30	0.37	0.38	-

Table 4: 2023, 2024 and 2025 Noise Contour Areas

The area of the 2023 57 dB $L_{Aeq,16h}$ contour area is 2.91 km^2, which is well below the contour area limit of 5.2 km^2. The areas of the noise contours for 2023 have increased compared to 2022. This is due to the change in fleet mix, with the greater use of louder passenger jet aircraft types more than countering the overall decrease in movements. The contour areas also remain smaller than in 2019, when the 57 dB $L_{Aeq,16h}$ contour area was 3.3 km^2.

The noise contour areas are forecast to increase over the next two years. The 57 dB contour areas are forecast to remain below the contour area limit in 2024 and 2025. The increase in contour area is due to the forecast increase in aircraft movements.

4.1 Population and Dwelling Counts

The population and dwelling data has been derived from a 2023 postcode database supplied by CACI Ltd. Population counts for the 2023 2024 and 2025 $L_{Aeq,16h}$ daytime contours are given in Table 5 and Table 6 below, the corresponding dwelling counts are given in Table 7 and Table 8.

Contour Level (dB $L_{Aeq,16h}$)	2023 Population	2024 Population	2025 Population
54	10,550	14,143	14,354
57	2,245	4,478	5,171
60	0	166	166
63	0	0	0
66	0	0	0
69	0	0	0

Table 5: Comparison of 2023, 2024 and 2025 Population Counts – Cumulative Totals

Year	Population by Contour Band (dB $L_{Aeq,16h}$)						Total
	> 69	69 – 66	66 – 63	63 – 60	60 – 57	57 – 54	
2023	0	0	0	0	2,245	8,305	10,550
2024	0	0	0	166	4,312	9,665	14,143
2025	0	0	0	166	5,005	9,183	14,354

Table 6: Comparison of 2023, 2024 and 2025 Population Counts

Contour Level (dB $L_{Aeq,16h}$)	2023 Dwellings	2024 Dwellings	2025 Dwellings
54	4,904	6,653	6,755
57	1,028	1,977	2,303
60	0	76	76
63	0	0	0
66	0	0	0
69	0	0	0

Table 7: Comparison of 2023, 2024 and 2025 Dwelling Counts – Cumulative Totals

Year	Dwellings by Contour Band (dB $L_{Aeq,16h}$)						Total
	> 69	69 – 66	66 – 63	63 – 60	60 – 57	57 – 54	
2023	0	0	0	0	1,028	3,876	4,904
2024	0	0	0	76	1,901	4,676	6,653
2025	0	0	0	76	2,227	4,452	6,755

Table 8: Comparison of 2023, 2024 and 2025 Dwelling Counts

The number of people and dwellings within the 2023 contours has increased compared to 2022, but remains less than in 2019, when there were 14,033 people and 6,699 dwellings within the 54 dB $L_{Aeq,16h}$ noise contours. The 2024 contours contain more people and dwellings than the 2023 contours, due to the increase in area of the 2024 contours. The number of people and dwellings in the contours is forecast to increase further in 2025, due to the increase in contour area.

There were no people or dwellings within the 63 – 60 dB $L_{Aeq,16h}$ contour band in 2023. In 2024 and 2025 there are forecast to be 166 people and 76 dwellings within this contour band.

5.0 QUOTA COUNT

As part of their planning agreement BCA are required to report the quota count for the year just completed. The quota count is based on the aircraft movements in the 92 day summer period and is limited to 4,665.

The quota count production methodology is described in paragraphs 6.4 to 6.6 of *PART II The Covenants* of the agreement. In summary, the method requires the certification data for the aircraft type, which is then processed and compared to a scale to determine the quota count for the aircraft type when arriving, and separately when departing.

For the aircraft that operated, the noise certification data has been obtained either from the noise certificate of the specific aircraft, or for those registered in the UK from the CAA G-INFO database[2] and those registered in Switzerland from the FOCA Swiss Aircraft Register[3]. Where certification data was not available, quota count values have been taken from the tables in the latest UK AIP Supplement[4]. In some cases the tables offer more than one value for an aircraft type, in these cases the expected QC value based on available information has been used, and where only limited information is available the higher QC value has been taken.

The resulting quota count total for summer 2023 was 1446.500, which is less than the limit of 4,665. Table 9 below gives details of how the quota count for summer 2023 has been calculated, including the specific arrival and departure quota count values used for the key aircraft types. Where more than one quota count value has been used for an aircraft type based on the individual noise certificates, both values are shown.

[2] https://siteapps.caa.co.uk/g-info/

[3] https://app02.bazl.admin.ch/web/bazl/en/#/lfr/search

[4] https://www.aurora.nats.co.uk/htmlAIP/Publications/2022-09-22/pdf/EG-eSUP-2022-058-en-GB.pdf

Aircraft Type	Arrivals	Arr. QC	Departures	Dep. QC	QC Total
Airbus A319ceo	611	0.25	508 101	0.25 0.5	330.250
Airbus A320ceo	348	0.25	348	0.5	261.000
Airbus A320neo	154	0.125	154	0.125	38.500
ATR 42	69	0.125	69	0	8.625
ATR 72	2,157	0.125	2,156	0.125	539.125
Beechcraft Super King Air	6	0	8	0	0.000
Bombardier Challenger 600	6	0.125	6	0.125	1.500
Cessna Citation Excel	9 3	0.125 0.25	12	0	1.875
Diamond DA-42	5	0	5	0	0.000
Embraer E145	44	0.125	44	0.125	11.000
Embraer E175	59	0.25	59	0.25	29.500
Embraer E190	337	0.125	55 281	0.25 0.5	196.375
Embraer E195-E2	5	0.125	5	0.125	1.250
Embraer Phenom 300	10	0	10	0	0.000
Pilatus PC-12	5	0	5	0	0.000
Saab 340	3 3	0.125 0.25	6	0.125	1.875
Other[1]	68	Various	68	Various	25.625
Total	**3,902**	**-**	**3,900**	**-**	**1446.500**

[1] Includes 23 movements by helicopters

Table 9: Summer 2023 Quota Count

6.0 MARGINALLY COMPLIANT CHAPTER 3 AIRCRAFT MOVEMENTS

As part of their planning agreement BCA are required to accept in respect of jet aircraft, only those air traffic movements that comply with the certificate limits, as laid down in Chapter 3 of Annex 16, of the standards adopted by the International Civil Aviation Organisation Council and which are not Marginally Compliant Aircraft. In the agreement these are defined as:

> 11. 'Marginally Compliant Aircraft' means civil subsonic jet aeroplanes, that meet the certification limits as laid down in Chapter 3 of Annex 16 by a cumulative margin of not more than 5 EPNdB, whereby the cumulative margin is a figure expressed in EPNdB obtained by adding the individual margins at each of the three reference noise management points as defined in Chapter 3 of Annex 16

BCA are required to report any movements in the year just completed by any aircraft not permitted to use the airport.

For the aircraft that operated in 2023, the noise certification data has been obtained either from the noise certificate of the specific aircraft, or for those registered in the UK from the CAA G-INFO database[2] and those registered in Switzerland from the FOCA Swiss Aircraft Register[3]. Where specific certification data was not available, certification values have been taken from the latest EASA Approved Noise Levels[5].

In some cases, the EASA database offers more than one possible classification for an aircraft type. In these cases a worst case assumption has been made.

There were no movements in 2023 by jet or large propeller aircraft types that do not meet the requirements of Chapter 3 or are only marginally compliant with Chapter 3, as shown below in Table 10. The table also includes the number of movements that fully comply with Chapter 3 or comply with the more stringent Chapter 4 or Chapter 14. The certification of helicopters and light propeller aircraft is to different standards and so these aircraft have been separately recorded.

[5] https://www.easa.europa.eu/easa-and-you/environment/easa-certification-noise-levels

2023 Aircraft Movements					
Not Chapter 3 or Chapter 3 Marginally Compliant	**Chapter 3 Fully Compliant**	**Chapter 4**	**Chapter 14**	**Helicopters and Light Propeller Aircraft**	**Total**
0	34	6,698	22,365	307	29,404

Table 10: 2023 Aircraft Noise Classification

7.0 SUMMARY

$L_{Aeq,16h}$ noise contours and the associated population counts have been produced, based on the actual movements during the 92 day summer period in 2023, and the forecast summer movements for 2024 and 2025. The movements used to produce them have been reported in addition to the contours and the number of people they contain.

The area of the 2023 57 dB $L_{Aeq,16h}$ contour area at 2.91 km^2 is well below the contour area limit of 5.2 km^2. The noise contour areas are forecast to increase over the next two years. However, the area of the 57 dB contours for 2024 and 2025 are forecast to remain below the contour area limit.

The 2023 57 dB $L_{Aeq,16h}$ contour contains 1,028 dwellings and a population of 2,245. There are no dwellings in the 60 dB or higher contours. The number of people and dwellings within the contours is forecast to increase over the next two years, mainly due to the forecast increase in aircraft movements. In both 2024 and 2025 there are forecast to be 166 people and 76 dwellings in the 60 – 63 dB contour band, but no dwellings in the 63 dB or higher contours.

The quota count total for summer 2023 was 1,446.500, which is less than the limit of 4,665.

There were no movements in 2023 by jet or large propeller aircraft types that do not meet the requirements of Chapter 3 or are only marginally compliant with Chapter 3, in compliance with the restriction on the airport.

Ajan Mohanaranjan
for Bickerdike Allen Partners LLP

Duncan Rogers
Senior Acoustic Consultant

David Charles
Partner

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LEGEND:

Initial Departure Routes

REVISIONS

Bickerdike Allen Partners
Architecture
Acoustics
Technology

121 Salusbury Road, London, NW6 6RG
Email: mail@bickerdikeallen.com T: 0207 625 4411
www.bickerdikeallen.com F: 0207 625 0250

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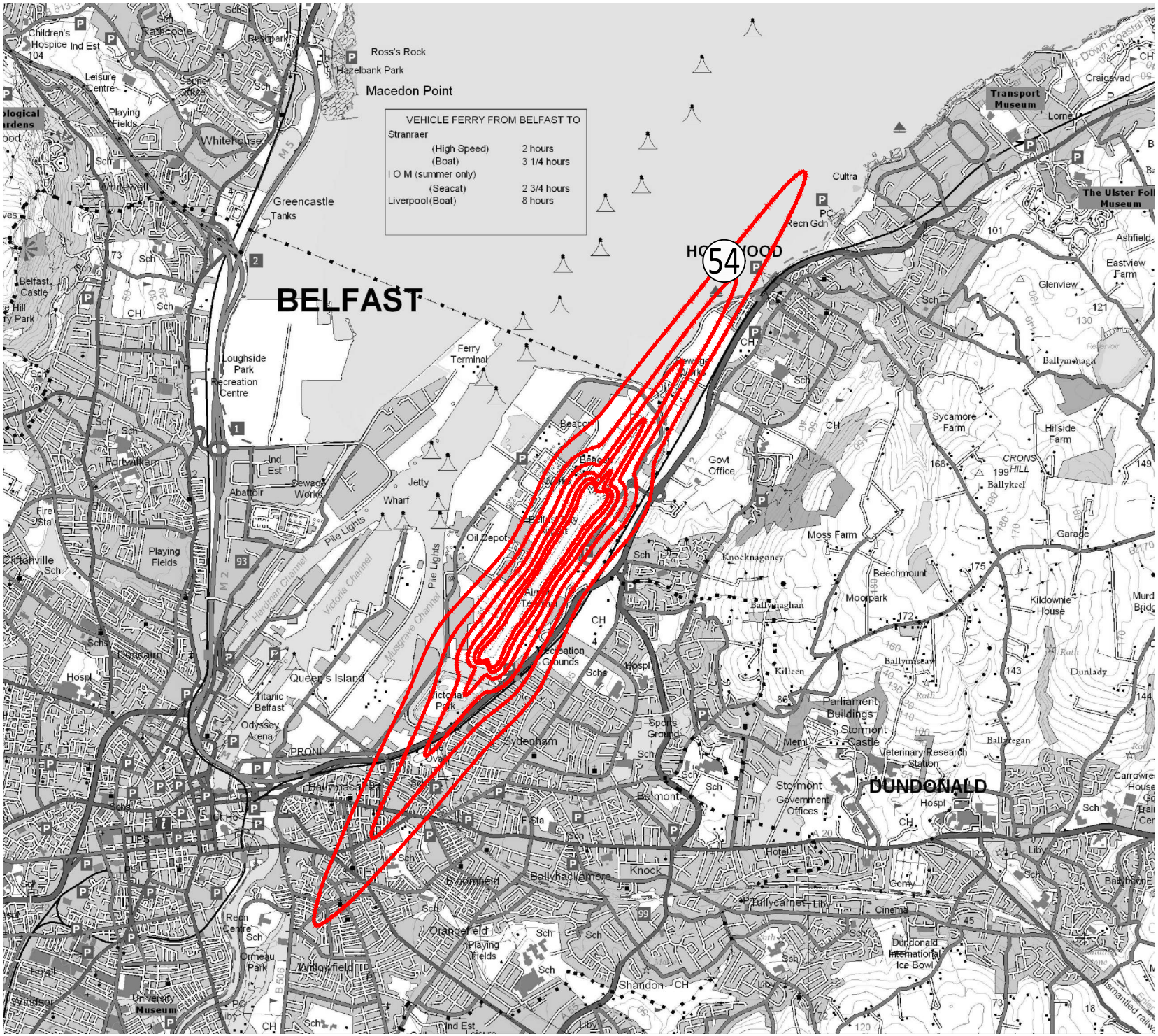
Figure 01
Initial Departure Routes

DRAWN: AM CHECKED: DC

DATE: February 2024 SCALE: 1:125,000@A4

FIGURE No:

A11298_14_DR001_1.0



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LEGEND:

Noise Contours,
54 to 69 dB $L_{Aeq,16h}$ in 3 dB steps

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Bickerdike Allen Partners
Architecture Acoustics Technology

121 Salusbury Road, London, NW6 6RG
Email: mail@bickerdikeallen.com T: 0207 625 4411
www.bickerdikeallen.com F: 0207 625 0250

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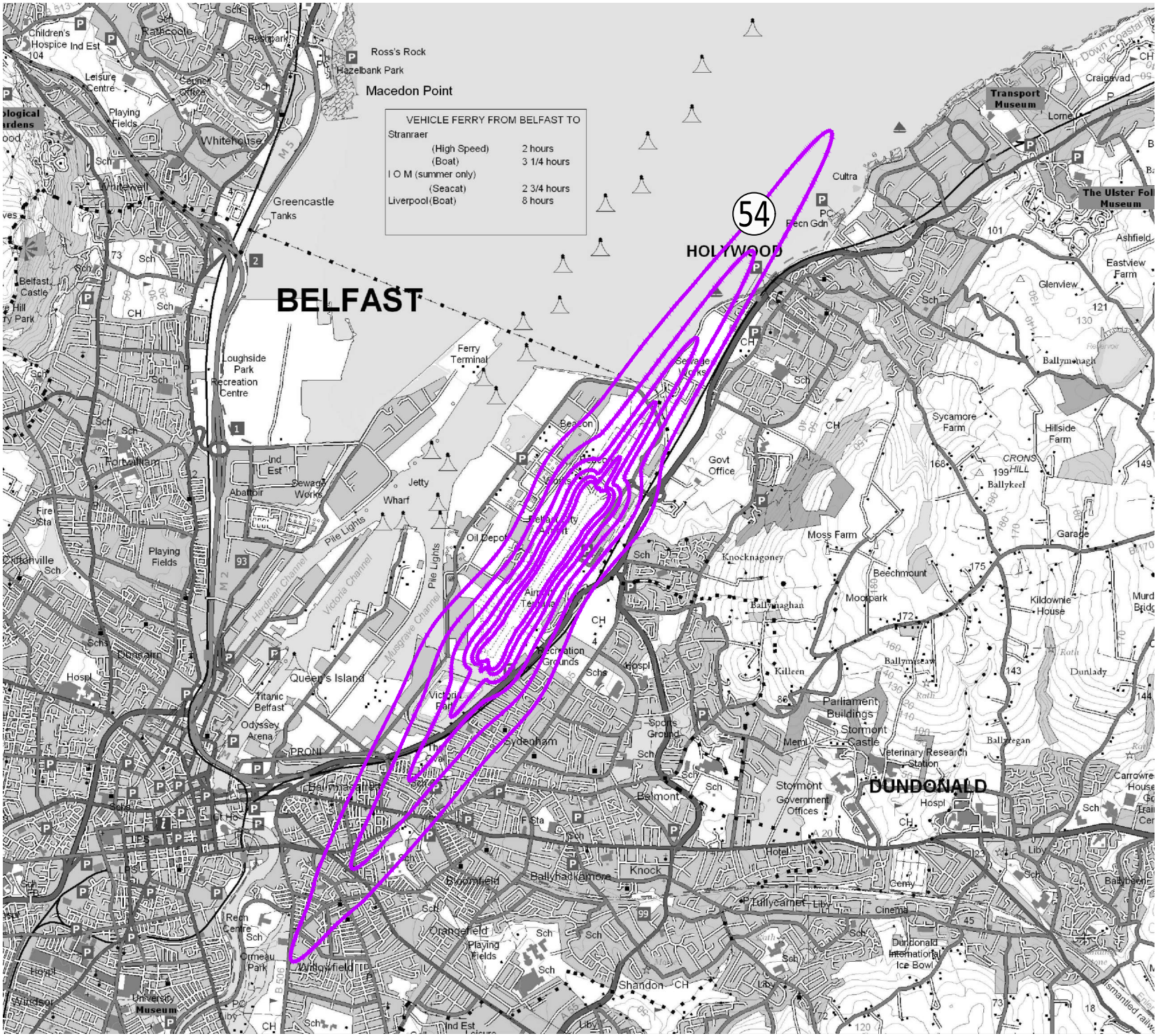
Figure 02
Summer Daytime Noise Contours
2023

DRAWN: DR CHECKED: DC

DATE: February 2024 SCALE: 1:50,000@A4

FIGURE No:

A11298_14_DR002_1.0



LEGEND:

Noise Contours,
54 to 69 dB $L_{Aeq,16h}$ in 3 dB steps

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Bickerdike Allen Partners
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Technology

121 Salusbury Road, London, NW6 6RG
Email: mail@bickerdikeallen.com T: 0207 625 4411
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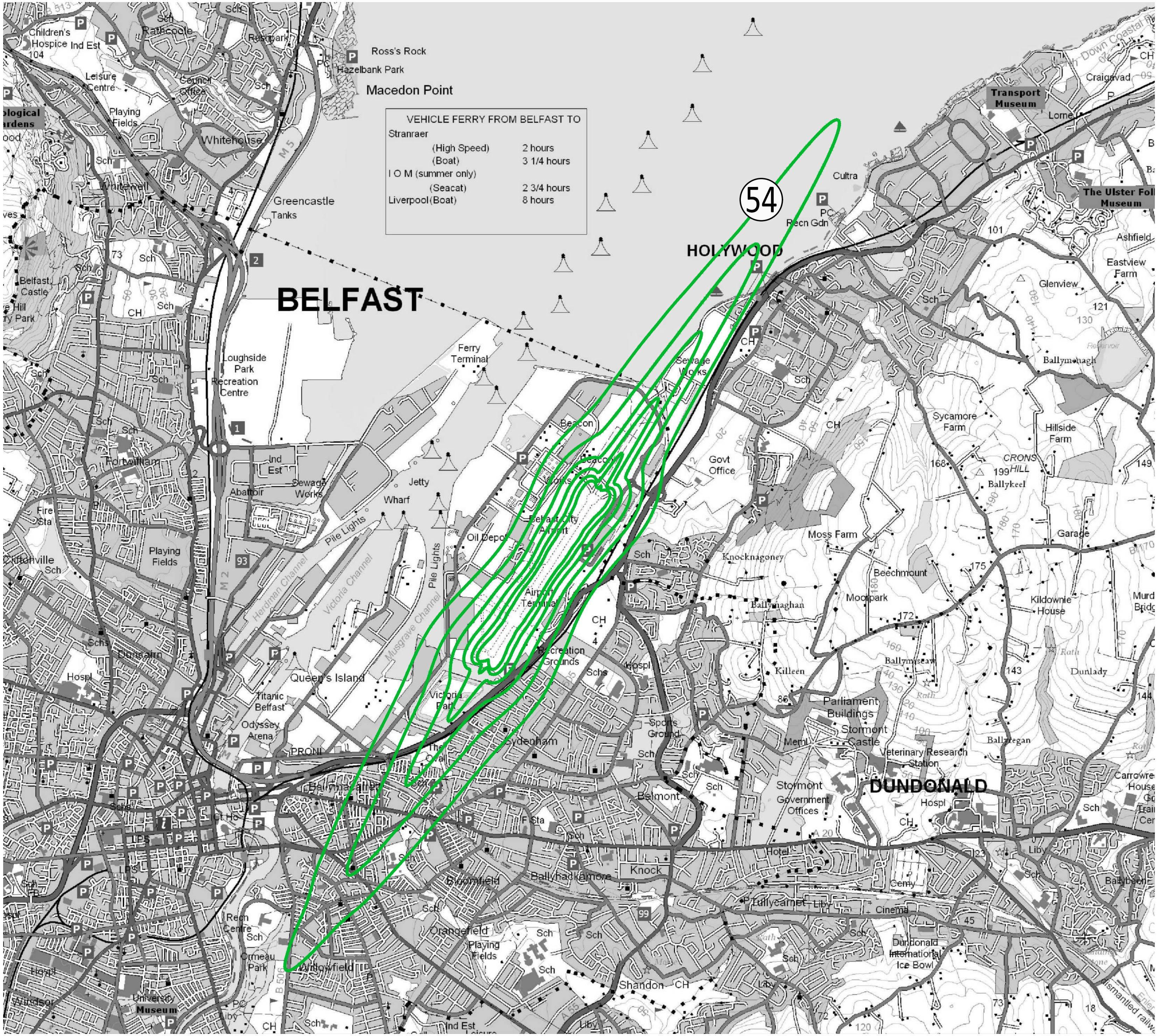
Figure 03
Summer Daytime Noise Contours
2024 Forecast

DRAWN: AM CHECKED: DC

DATE: February 2024 SCALE: 1:50,000@A4

FIGURE No:

A11298_14_DR003_1.0



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LEGEND:

Noise Contours, 54 to 69 dB $L_{Aeq,16h}$ in 3 dB steps

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Bickerdike Allen Partners
Architecture Acoustics Technology

121 Salusbury Road, London, NW6 6RG
Email: mail@bickerdikeallen.com
www.bickerdikeallen.com
T: 0207 625 4411
F: 0207 625 0250

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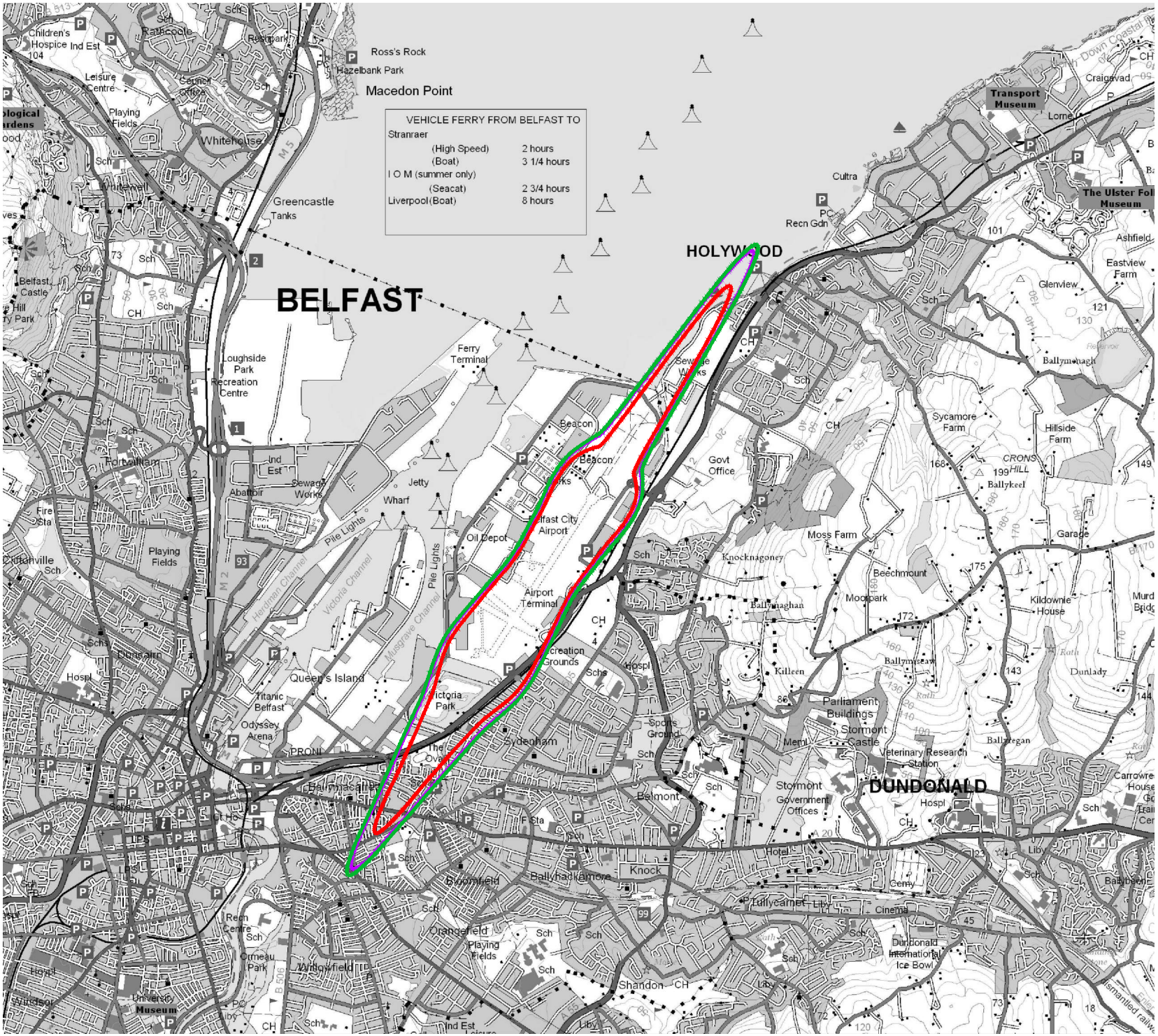
Figure 04
Summer Daytime Noise Contours
2025 Forecast

DRAWN: AM CHECKED: DC

DATE: February 2024 SCALE: 1:50,000@A4

FIGURE No:
A11298_14_DR004_1.0



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LEGEND:

Noise Contours,

- 2023
- 2024
- 2025

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121 Salusbury Road, London, NW6 6RG
Email: mail@bickerdikeallen.com T: 0207 625 4411
www.bickerdikeallen.com F: 0207 625 0250

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Figure 05
Summer Daytime Noise Contours
2023, 2024 and 2025 57 dB $L_{Aeq,16h}$

DRAWN: AM CHECKED: DC

DATE: February 2024 SCALE: 1:50,000@A4

FIGURE No:

A11298_14_DR005_1.0

APPENDIX 1
GLOSSARY OF ACOUSTIC TERMINOLOGY

Sound

This is a physical vibration in the air, propagating away from a source, whether heard or not.

The Decibel, dB

The unit used to describe the magnitude of sound is the decibel (dB) and the quantity measured is the sound pressure level. The decibel scale is logarithmic and it ascribes equal values to proportional changes in sound pressure, which is a characteristic of the ear. Use of a logarithmic scale has the added advantage that it compresses the very wide range of sound pressures to which the ear may typically be exposed to a more manageable range of numbers. The threshold of hearing occurs at approximately 0 dB (which corresponds to a reference sound pressure of 2 x 10-5 Pascals) and the threshold of pain is around 120 dB.

The sound energy radiated by a source can also be expressed in decibels. The sound power is a measure of the total sound energy radiated by a source per second, in Watts. The sound power level, L_w is expressed in decibels, referenced to 10-12 Watts.

Frequency, Hz

Frequency is analogous to musical pitch. It depends upon the rate of vibration of the air molecules which transmit the sound and is measure as the number of cycles per second or Hertz (Hz). The human ear is sensitive to sound in the range 20 Hz to 20,000 Hz (20 kHz). For acoustic engineering purposes, the frequency range is normally divided up into discrete bands. The most commonly used bands are octave bands, in which the upper limiting frequency for any band is twice the lower limiting frequency, and one-third octave bands, in which each octave band is divided into three. The bands are described by their centre frequency value and the ranges which are typically used for building acoustics purposes are 63 Hz to 4 kHz (octave bands) and 100 Hz to 3150 Hz (one-third octave bands).

A-Weighting

The sensitivity of the ear is frequency dependent. Sound level meters are fitted with a weighting network which approximates to this response and allows sound levels to be expressed as an overall single figure value, in dB(A).

Effective Perceived Noise Level

Effective Perceived Noise Level (EPNL) is a measure used to express noise levels which analyses the frequency spectra of noise events as well as the duration of sound. The measurement unit for EPNL is EPNdB. This measure is used for the noise certification of aircraft, and the subsequent quota count determination.

Quota Count

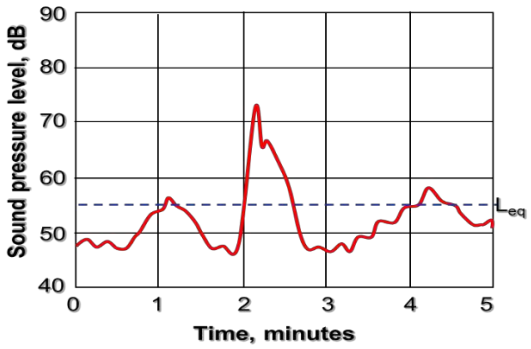
The value assigned to one take-off or to one landing by the aircraft in question, this number being related to its noise classification. The classification is determined from the noise level band in EPNdB, for take-off or landing, as the case may be, for the aircraft in question, as defined in the individual aircraft's noise certificate.

Environmental noise descriptors

Where noise levels vary with time, it is necessary to express the results of a measurement over a period of time in statistical terms. Some commonly used descriptors follow.

$L_{Aeq,T}$ The most widely applicable unit is the equivalent continuous A-weighted sound pressure level (LAeq,T). It is an energy average and is defined as the level of a notional sound which (over a defined period of time, T) would deliver the same A-weighted sound energy as the actual fluctuating sound.

This is shown in the graph below:



Noise Contour

A line which joins points on the ground which receive the same noise exposure from the nearby airborne aircraft; often for daytime studies the exposure is considered over a 16 hour period ($L_{Aeq,16h}$) and for night studies over a 8 hour period (LAeq,8h) with a range of levels used to express the different exposures.

Sound transmission in the open air

Most sources of sound can be characterised as a single point in space. The sound energy radiated is proportional to the surface area of a sphere centred on the point. The area of a sphere is proportional to the square of the radius, so the sound energy is inversely proportional to the square of the radius. This is the inverse square law. In decibel terms, every time the distance from a point source is doubled, the sound pressure level is reduced by 6 dB.

Meteorological effects

Temperature and wind gradients affect noise transmission, especially over large distances. The wind effects range from increasing the level by typically 2 dB downwind, to reducing it by typically 10 dB upwind – or even more in extreme conditions. Temperature and wind gradients are variable and difficult to predict.

Aviation terms

NPR

Noise preferential route – departure flight ground tracks to be followed by aircraft to minimise noise disturbance on the surrounding population.

Dispersion

Due to the effect of the wind, aircraft speed, and pilot choice differing aircraft tracks about the nominal track are flown; this is known as dispersion around a nominal track.

Start of Roll

The position on a runway where aircraft commence their take-off runs.

Threshold

The beginning of that portion of the runway usable for landing.

Radar Vectoring

Aircraft are provided by Air Traffic Control (ATC) with various instructions which result in changes of heading, altitude, and speed. The controller affects safe separation from other traffic by use of radar.

Nominal Tracks

Using recognised international design techniques, tracks across the ground can be delineated for departing and arriving aircraft. These tracks are nominal because they can be influenced by the wind, ATC instructions, the accuracy of navigational systems and the flight characteristics of individual aircraft. In UK it is usual to permit a 1500m swathe to be established about the nominal track for the purposes of assessing whether an aircraft has stayed on track.

Altitude

Height of aircraft above sea level.

APPENDIX 2
GEORGE BEST BELFAST CITY AIRPORT
2023 NOISE CONTOUR VALIDATION

INTRODUCTION

Summer noise contours have been prepared for George Best Belfast City Airport (GBBCA) for a number of years. This has involved the use of the Federal Aviation Administration (FAA) prediction methodology, the Integrated Noise Model (INM).

The INM software has been used around the world in over 50 countries and consequently is flexible enough to allow local circumstances to be taken into account. This can be achieved by entering specific departure routes, operational profiles, or weather conditions but also by creating or modifying specific noise information for aircraft types.

In order to improve the accuracy of the modelling at GBBCA, validation exercises have been conducted which compare predicted noise levels for individual aircraft movements with noise levels measured at Belfast. This is particularly useful for aircraft types where the INM does not have actual data and so suggests a substitute type.

VALIDATION

The validation exercises use the measured results from the permanent noise monitoring system at GBBCA. Specifically, the results from the Noise Monitoring Terminal (NMT) at Nettlefield Primary School (MP01) and at Kinnegar Army Camp (MP02). These NMT locations are approximately 4.5 km from the start of roll location of runway 22 and 3.9 km from the start of roll location of runway 04 respectively. MP02 was relocated on 22nd August 2023, however this validation exercise is based on the 11.5 months of data prior to the relocation. Specifically it uses recent results from the NMTs which include the results for the period September 2022 to September 2023 for MP01 and September 2022 to 21st August 2023 for MP02, which comprise around 25,000 individual aircraft measurements.

Seven aircraft types have been selected to be analysed in the validation exercise. These are the Airbus A319ceo, A320ceo and A320neo, the ATR 72, the Bombardier Dash 8, the Embraer E175 and E190. These aircraft types comprised around 90% of the summer period movements in 2023 and were also selected for the 2022 validation exercise.

The average measured noise levels used for the 2023 validation exercise are given below in Table A2.1 for these aircraft types, where they are compared with the corresponding measured results used for the 2022 validation exercise. This shows that the average measured noise levels for these types have not generally varied by more than 1 dB compared to 2022. The exception is arrivals by the Embraer E175, which have increased by around 1.5 dB. In 2023 a manual correlation exercise was carried out, which resulted in a large increase in the number of correlated noise events compared to those available for 2022.

Aircraft Type	Operation	2023 Validation Measured Noise Levels (SEL dB)		2022 Validation Measured Noise Levels (SEL dB)	
		Number	Average	Number	Average
Airbus A319ceo	Arrival Rwy 04	450	85.6	57	85.4
	Arrival Rwy 22	798	89.3	100	88.8
	Departure Rwy 04	387	88.8	62	88.7
	Departure Rwy 22	877	87.5	100	88.0
Airbus A320ceo	Arrival Rwy 04	523	85.5	103	86.1
	Arrival Rwy 22	1,260	89.6	305	89.5
	Departure Rwy 04	494	89.0	126	89.3
	Departure Rwy 22	1,276	87.4	328	87.9
Airbus A320neo	Arrival Rwy 04	140	84.4	7	84.5
	Arrival Rwy 22	292	88.1	36	88.1
	Departure Rwy 04	131	85.4	16	85.2
	Departure Rwy 22	312	84.0	38	84.3
ATR 72	Arrival Rwy 04	2,161	83.5	307	83.4
	Arrival Rwy 22	4,552	87.9	407	86.8
	Departure Rwy 04	2,178	82.0	306	81.1
	Departure Rwy 22	4,510	82.4	386	82.5
Bombardier Dash 8	Arrival Rwy 04	228	82.5	146	82.3
	Arrival Rwy 22	1,089	86.2	200	85.3
	Departure Rwy 04	198	78.8	103	78.6
	Departure Rwy 22	912	79.4	160	79.0
Embraer E175	Arrival Rwy 04	58	85.4	52	83.8
	Arrival Rwy 22	111	88.7	83	87.3
	Departure Rwy 04	58	89.2	56	88.7
	Departure Rwy 22	116	87.9	63	87.1
Embraer E190	Arrival Rwy 04	379	86.2	77	86.4
	Arrival Rwy 22	662	88.7	215	88.3
	Departure Rwy 04	357	89.8	89	89.5
	Departure Rwy 22	678	88.8	207	89.0

Table A2.1: Measured Noise Levels used for Validation in 2023 and 2022

For each aircraft type there are four sets of measured results; arrivals and departures at each of the two monitors. As the monitors are not located symmetrically with regard to the runway the noise levels at each will differ and so they need to be considered separately. For the individual movements within a set there is some variation, so every arrival by an aircraft type does not produce exactly the same noise level. There are a number of factors which contribute to this, in particular the weather conditions.

The spread of results is illustrated in Figures A2.1 to A2.2 below. These show the distribution of measured noise levels from the validation period for the most common operations, arrivals from the north and departures to the south, for the most common aircraft type in the summer period of 2023, the ATR 72.

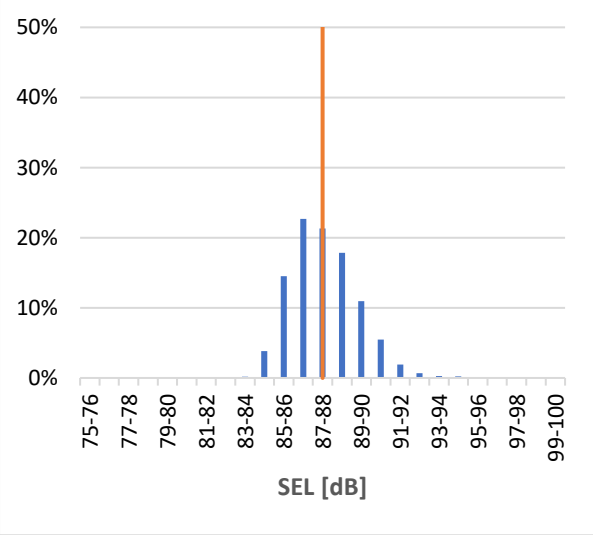


Figure A2.1 – ATR 72 Arrivals

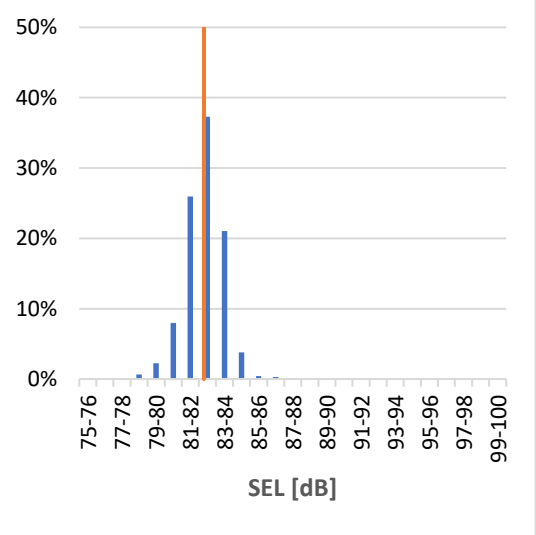


Figure A2.2 – Airbus ATR 72 Departures

The distributions have the large majority of measured noise levels closely grouped together around the averages, shown as a vertical red line on the figures, with a pattern that approximates to a normal distribution with a standard deviation of less than 2 dB. Such distributions of measured noise levels are commonly found at airport fixed noise monitors at a similar distance from the runway. From the distributions of measured noise levels for each of the aircraft types considered, the averages have been determined and compared to INM standard predicted noise levels. Table A2.2 gives the latest measured average noise levels for the seven aircraft types considered for validation in 2023.

Aircraft Type	Operation	2023 Validation Measured Noise Levels (SEL dB)		INM Standard Assumptions (SEL dB)	
		Number	Average	Type	Level
Airbus A319ceo	Arrival Rwy 04	450	85.6	A319-131	87.0
	Arrival Rwy 22	798	89.3		90.0
	Departure Rwy 04	387	88.8		87.9
	Departure Rwy 22	877	87.5		87.0
Airbus A320ceo	Arrival Rwy 04	523	85.5	A320-211	87.4
	Arrival Rwy 22	1,260	89.6		90.2
	Departure Rwy 04	494	89.0		89.4
	Departure Rwy 22	1,276	87.4		88.2
Airbus A320neo(1)	Arrival Rwy 04	140	84.4	A320-211	87.4
	Arrival Rwy 22	292	88.1		90.2
	Departure Rwy 04	131	85.4		89.4
	Departure Rwy 22	312	84.0		88.2
ATR 72(1)	Arrival Rwy 04	2,161	83.5	DO328	86.3
	Arrival Rwy 22	4,552	87.9		89.7
	Departure Rwy 04	2,178	82.0		82.1
	Departure Rwy 22	4,510	82.4		81.6
Bombardier Dash 8(1)	Arrival Rwy 04	228	82.5	SD330	82.2
	Arrival Rwy 22	1,089	86.2		84.5
	Departure Rwy 04	198	78.8		82.1
	Departure Rwy 22	912	79.4		81.6
Embraer E175	Arrival Rwy 04	58	85.4	EMB175	85.5
	Arrival Rwy 22	111	88.7		88.3
	Departure Rwy 04	58	89.2		87.8
	Departure Rwy 22	116	87.9		87.4
Embraer E190	Arrival Rwy 04	379	86.2	EMB190	86.6
	Arrival Rwy 22	662	88.7		89.0
	Departure Rwy 04	357	89.8		86.8
	Departure Rwy 22	678	88.8		86.0

(1) INM does not contain specific data for this type so alternatives used.

Table A2.2: Measured and Standard Predicted Noise Levels

Approach to Validation

The general approach to validation modifications has been to only change from the INM standard type when the measured results show clear divergence, i.e. an apparent prediction error in excess of 1.5 dB at a single NMT or an average error of over 1.0 dB across both NMTs. If the type has historically been modified from the standard type, then the approach has been to only change from the previous validation when there is an apparent prediction error or change in measured level in excess of 1.0 dB at a single NMT. Also, the approach seeks to determine any modification by aircraft type and aircraft operation, but not by runway used. This means one modification is adopted for all arrivals by an aircraft type, and one for all departures by an aircraft type.

Comparison of Measured and Predicted Results

Some changes have been made to the modifications compared to those used for the 2022 contours. The Airbus A320ceo has been factored down on arrival, whereas the ATR 72 and Embraer 175 have been factored up on arrival. The Embraer E175 has also been factored up on departure.

The final validation modifications are summarised below in Table A2.3. These have been used for the 2023, 2024 and 2025 contours.

Aircraft Type	INM Type	Modification to Movements Numbers	
		Arrivals	Departures
Airbus A319ceo	A319-131	A319-131 × 0.7	A319-131 × 1.2
Airbus A320ceo	A320-211	A320-211 × 0.8	A320-211 × 1.0
Airbus A320neo	A320-211	A320-211 × 0.6	A320-211 x 0.4
ATR 72	DO328/DHC6	DO328 × 0.6	DHC6 × 1.0
Bombardier Dash 8	SD330/DHC6	SD330 × 1.1	DHC6 x 0.5
Embraer E175	EMB175	EMB175 × 1.1	737500 x 1.2
Embraer E190	EMB190	EMB190 × 1.0	EMB190 × 1.8

Table A2.3: 2023 Validation Modifications

The need for modifications for the larger aircraft types in particular is not unexpected as they are available in a range of specifications with different engine types, sometimes from different manufacturers. This means that the actual type operated by the airline may differ to the one in the INM software.

The Airbus A319ceo has been modelled with the standard type but with departures factored up and arrivals factored down. The Airbus A320ceo, also using the standard type, is factored down on arrival, but unmodified on departure. The Airbus A320neo is a newer quieter version of the A320ceo and is therefore factored down on both arrival and departure.

For the ATR 72, modifications were needed to the INM type as the substitute type it suggests does not agree well with the measured departure results. On arrival the substitute type was used, but with movements factored down.

For the Bombardier Dash 8 modifications were needed to the INM type as the substitute type it suggests does not agree well with the measured results. The validation finds that using the Dash 6 (DHC6) for departures and the Shorts 330 (SD330) for arrivals, with movement numbers factored, agrees well with measured noise levels.

For the Embraer E175, modifications were needed to the INM type as the standard type does not agree well with the measured departure results. On arrival the standard type was used, but with movements factored up.

For the Embraer E190, the standard INM type has been used, but with departures factored up.

Effect of Validation

The effect of the validation exercise on the predicted noise levels for the seven aircraft types is detailed in Table A2.4 which gives the differences between the measured noise levels and those predicted after allowing for the validation modifications.

Aircraft Type	Operation	Noise Levels (SEL dB)			
		Measured Average	INM Validated Prediction	Difference Predicted - Measured	Operation Weighted Average Difference
Airbus A319ceo	Arrival Rwy 04	85.6	85.5	- 0.1	- 0.6
	Arrival Rwy 22	89.3	88.5	- 0.8	
	Departure Rwy 04	88.8	88.7	- 0.1	+ 0.2
	Departure Rwy 22	87.5	87.8	+0.3	
Airbus A320ceo	Arrival Rwy 04	85.5	86.4	+ 0.9	+ 0.0
	Arrival Rwy 22	89.6	89.2	- 0.4	
	Departure Rwy 04	89.0	89.4	+ 0.4	+ 0.7
	Departure Rwy 22	87.4	88.2	+ 0.8	
Airbus A320neo	Arrival Rwy 04	84.4	85.2	+ 0.8	+ 0.2
	Arrival Rwy 22	88.1	88.0	- 0.1	
	Departure Rwy 04	85.4	85.4	+ 0.0	+ 0.1
	Departure Rwy 22	84.0	84.2	+ 0.2	
ATR 72	Arrival Rwy 04	83.5	84.1	+ 0.6	- 0.1
	Arrival Rwy 22	87.9	87.5	- 0.4	
	Departure Rwy 04	82.0	82.1	+ 0.1	- 0.5
	Departure Rwy 22	82.4	81.6	- 0.8	
Bombardier Dash 8	Arrival Rwy 04	82.5	83.7	+ 1.2	+ 0.0
	Arrival Rwy 22	86.2	86.0	- 0.2	
	Departure Rwy 04	78.8	79.1	+ 0.3	- 0.6
	Departure Rwy 22	79.4	78.6	- 0.8	
Embraer E175	Arrival Rwy 04	85.4	85.9	+ 0.5	+ 0.2
	Arrival Rwy 22	88.7	88.7	+ 0.0	
	Departure Rwy 04	89.2	88.6	- 0.6	+ 0.0
	Departure Rwy 22	87.9	88.2	+ 0.3	
Embraer E190	Arrival Rwy 04	86.2	86.6	+ 0.4	+ 0.3
	Arrival Rwy 22	88.7	89.0	+ 0.3	
	Departure Rwy 04	89.8	89.4	- 0.4	- 0.3
	Departure Rwy 22	88.8	88.6	- 0.2	

Table A2.4: Measured and Validated Predicted Noise Levels

Table A2.4 shows that with the validation modifications there is good correlation between measured and predicted noise levels with differences of less than 1 dB when results from both NMTs are operationally averaged.

The effect of the validation exercises on the contours depends both on the modifications made and the contribution of those aircraft types to the overall noise. Changes to infrequent aircraft types are likely to have very little effect on the contours.

SUMMARY

The validation of noise contours at George Best Belfast City Airport has been continually improved, more recently by checking predictions against the results obtained from GBBCA's noise monitors. This has demonstrated that without validation the standard INM assumptions would be less accurate.

The latest contours have taken into account around 25,000 individual aircraft noise measurements at GBBCA between September 2022 and September 2023. This has identified the need to modify the standard INM assumptions for seven aircraft, the Airbus A319ceo, Airbus A320ceo, Airbus A320neo, ATR 72, Bombardier Dash 8, Embraer E175 and Embraer E190.

GBBCA will continue to collect further detailed information from the fixed noise monitors at Nettlefield Primary School and the new location of MP02, which will be used to regularly validate future GBBCA contours. This is in line with the EiP Panel's advice on contour validation.

Appendix 3

Extension & Departure Noise Charges 1 Jan to 31 Dec 2023

Extensions

Time Period	A	D	Total	Ext charge	Total
21:31 - 21:45	115	21	136	£100	£13,600
21:46 - 22:00	73	18	91	£125	£11,375
22:01 - 22:15	40	16	56	£150	£8,400
22:16 - 22:30	22	11	33	£300	£9,900
22:31 - 22:45	13	7	20	£400	£8,000
22:46 - 23:00	11	0	11	£550	£6,050
23:01 - 23:15	2	0	2	£700	£1,400
23:16 - 23:30	0	0	0	£800	£0
23:31 - 23:45	1	0	1	£900	£900
23:46 - 23:59	1	0	1	£1,000	£1,000
Sub-total	278	73	351		£60,625
No flts > 480				£300	£0
Total					£60,625

Departure Noise Exceedances

Excess over dBLASmax		Charge	Total
No greater than 3 dB(A)	0	£500	£0
Greater than 3 dB(A)	0	£1,000	£0
Total			£0
Grand Total			**£60,625**

AIRPORT OPERATIONAL INSTRUCTION (AOI)

AOI-07

Issue 8

Subject:	**Aircraft Engine Ground Running and Use of Auxiliary Power Units and Ground Power Units**
Date of issue:	**20 March 2023**
Authorised by:	DocuSigned by: 14438788A10A4AE... **Michael McDowell, Airfield Operations Manager**

It is the responsibility of all employers to ensure that relevant Airport Operational Instructions (AOIs) and Operational Safety Notices (OSNs) are brought to the attention of their staff. However, individuals remain responsible for their own actions and those who are in doubt should consult their supervisor or manager within their own organisation.

1. Introduction

Belfast City Airport (BCA) is responsible for taking adequate measures to ensure the safety of aircraft, vehicles and persons using the airside environment.

Environmental Policy:
"Through its programme of sustainable development, GBBCA is committed to achieving a balance between the social and economic benefits of the airport's growth and its environmental impacts. We will work with all airport 'stakeholders', including statutory authorities, airlines, business partners and local residents to minimise the impact of our operations on the environment".

2. Distribution and Control

This AOI is published and distributed electronically to organisations involved with the operation of aircraft and supporting services at BCA. The controlled copy is located in the Airport Online Document Library.

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Comments or queries relating to the contents of this document should be directed to:

Airfield Operations Manager
Belfast City Airport
Sydenham Bypass
BELFAST
BT3 9JH

Telephone: 028 9093 5006

3. Acronyms

AOI	Airport Operational Instruction
APU	Auxiliary Power Unit
ATC	Air Traffic Control
BCA	Belfast City Airport
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
FEGP	Fixed Electrical Ground Power
FOD	Foreign Object Debris
GPU	Ground Power Unit
OPS	Airfield Operations
OSN	Operational Safety Notice
SMS	Safety Management System

4. Requirements

Aircraft Engine Ground Running

Aircraft engine ground runs are required under certain conditions to enable engineers to certify that an aircraft is "fit for service".

However, engine ground runs cause both significant adverse impact on the environment and create hazards on the apron. They are therefore strictly controlled within the terms of the BCA Environmental Policy, and CAP 642 guidelines.

CAP 642 (Airside Safety Management) advises:
"Engine runs and check starts should be controlled and only carried out with prior approval of the aerodrome operator who should specify the conditions to be applied." This AOI outlines these conditions.

5. Definitions

Engine Ground Run

An engine ground run is defined in **CAP 642 (Airside Safety Management)** as:

"Any engine start-up not followed immediately by the departure of the aircraft concerned."

Person in Charge

The Person in Charge is that ground engineer in contact with the flight deck (usually via headset). This person has full view of the surrounding area and can indicate to the flight deck immediately to cut the engine power in the event of an incident or potential hazard.

Auxiliary Power Units (APU)

Small gas turbines normally mounted in the rear fuselage of most aircraft. They are used to power electrical systems on board, to run air circulation and conditioning systems and to supply bleed air for starting main engines before or during push back.

Mobile Ground Power Units (GPU)

A vehicle capable of supplying power to aircraft parked on the ground usually powered by diesel fuel.

Fixed Electrical Ground Power (FEGP)

Ground based power system which uses grid electricity. An electrical supply cable is plugged into the underside of the aircraft and draws its power from the airport's electricity supply.

6. Hazards

Engine ground runs present an extremely dangerous and complex operation. They carry a high risk of engine ingestion and pose a hazard to ramp personnel and vehicular traffic.

7. General Rules

It must always be ensured that:

- The 'Person in Charge' is in communication with the flight deck (ideally via a headset).
- All the aircraft wheels are chocked (aprons only).
- If on the main apron, the rear of stand roadway has been closed off.

Use of aircraft Auxiliary Power Units (APUs)

Aircraft APUs generate high levels of noise and significant fumes which can cause disturbance to those on nearby aprons, in buildings and in residential areas.

BCA has provided Fixed Electrical Ground Power (FEGP) on Stands 1–10 for the purpose of minimising levels of ambient noise and emissions.

On stands where FEGP is available, it must be used in preference to APUs, where possible.

Airlines and handlers are to ensure that APUs are used for the absolute minimum time necessary to meet operational needs.

APUs are not to be used as a substitute for either FEGP or GPUs.

Use of mobile Ground Power Units (GPUs)

Constantly running mobile GPUs can cause high noise levels on the apron, are an additional obstruction to free movement around a parked aircraft and, if poorly maintained, may deposit oil spillage on the stand.

BCA has provided FEGP on Stands 1–10 for the purpose of minimising levels of ambient noise and emissions.

On stands where FEGP is available, it must be used in preference to GPUs, where possible.

Where there is no alternative to the use of GPUs they should be parked outside the stand (when aircraft parked nose in) and promptly shut down when power is no longer required. The GPU should never be parked over a drain.

When purchasing new GPUs airlines and handling agents are urged to make low working noise levels a prime requirement in the selection process.

8. Approval

Aircraft Engine Ground Running

8.1 Aircraft Parked on Apron Areas (Main Apron & General Aviation Apron)

All engine ground runs shall be subject to the prior approval of Airfield Operations (extension **5027**). Airfield Operations (OPS) will record details electronically for audit purposes.

Requests to carry out engine ground runs must be made no later than 2130 hours' local time.

All engine ground runs are strictly prohibited between 2230 – 0600 hours.

Engine ground runs are permitted on apron areas at "engine idle" setting for short periods of time only. **All other engine runs including high powered runs** require the aircraft to be positioned to the north side of the airfield at "**Sierra"**.

A map illustrating the location of "Sierra" on the north side of the airfield is contained at **Annex A**.

Prior to making a request for permission to carry out an engine ground run the 'Person in Charge' must assess the surrounding area for potential hazards.

The 'Person in Charge' should then seek prior permission to conduct the engine ground run by contacting OPS (extension **5027**) or alternatively by contacting Flight Dispatch on the ground handling frequency. Flight Dispatch staff shall in turn contact OPS.

OPS will advise if the engine ground run is approved.

Once approval has been obtained pilots/engineers must seek permission to start engines from Air Traffic Control (ATC) – Radio contact must be maintained with ATC at all times.

8.2 Aircraft parked on "Sierra" (Airfield north side)

Engine ground runs in this area may be of a higher power.

Engine ground runs in this area are permitted between 0630 – 2130 hours. Pilots/engineers who wish to carry out engine grounds runs on the north side of the airfield between these hours should seek prior permission from OPS (extension **5027**).

Annex B sets out the 'Follow-me' procedure for engineers taxiing aircraft between the apron and Sierra.

8.3 Use of Auxiliary Power Units (APUs)

Use of APUs for aircraft maintenance purposes is strictly prohibited between 2230 – 0600 hours unless there is no alternative power source available (FEGP or GPU).

Should APU use be required outside of permitted hours (0600 hours – 2230 hours), prior approval must be sought from OPS (extension **5027**).

9. Safety

All personnel concerned with engine ground running must be fully conversant with this instruction, which must be complied with at all times.

The 'Person in Charge' of the engine ground run is responsible for ensuring the safety of personnel and equipment in the vicinity of the aircraft.

The use of aircraft strobe lighting is strictly prohibited during engine ground runs.

Consistent with CAA guidance, aircraft strobe lighting should not be displayed for any reason when an aircraft is on the apron or taxiway areas.

Any essential engineering work requiring a strobe light test shall only be carried out when the airport has closed.

9.1 Aircraft Parked on Apron Areas (Main Apron & General Aviation Apron)

The 'Person in Charge' of the engine ground run must ensure that all apron equipment is placed at a safe distance from the aircraft.

The aircraft must be positioned correctly on the stand in such a way that the engine running will not harm persons or cause damage to aircraft, buildings, installations, vehicles or equipment in the vicinity.

On the main apron, the rear of stand road must be closed to safeguard vehicular traffic, before the engine ground run is commenced. This must be undertaken by the airline engineering department or handling agent.

In the event that the closure of the rear of stand road will cause severe disruption to the timely dispatch of other aircraft, OPS may deny approval or request ATC to stop the engine ground run.

If aircraft are parked in a non-standard fashion (e.g. not nose in due to high winds) then all engine ground runs are prohibited on the main apron at this time.

The engine anti-collision beacons must be switched on for the duration of the engine ground run.

The 'Person in Charge' of the engine ground running activities must ensure that all the aircraft wheels are chocked and that the aircraft cannot move under any circumstances.

Engine ground running must not take place and must be ceased when passengers are being embarked/disembarked on any adjacent stands.

The 'Person in Charge' must be in communication with the flight deck at all times during engine ground runs. This will ensure that the engine(s) can be shut down if persons or vehicles move into a dangerous position in front of, behind or in the vicinity of a live engine.

In all instances where aircraft are unserviceable, they should be relocated to a non-contact stand or to the north side of the airfield. Airfield OPS will advise a suitable location.

9.2 Aircraft parked on "Sierra" (Airfield north side)

The aircraft must be positioned in such a way that the engine running will not harm persons or cause damage to aircraft, buildings, installations, vehicles or equipment in the vicinity. The aircraft must also be positioned within the white circle provided.

The "Person in Charge" must ensure that the ground area behind the aircraft is free from loose tarmac, stones and other materials.

The engine anti-collision beacon(s) must be switched on for the duration of the ground run.

The "Person in Charge" must be in communication with the flight deck at all times during engine ground runs. This will ensure that the engine(s) can be shut down if persons or vehicles move into a dangerous position in front of, behind or in the vicinity of a live engine.

NOTE: Where OPS find that the procedures outlined here are not being complied with, or where it is necessary in the interests of safety, they will request ATC, or directly to the 'Person in Charge', to have the engine ground run halted.

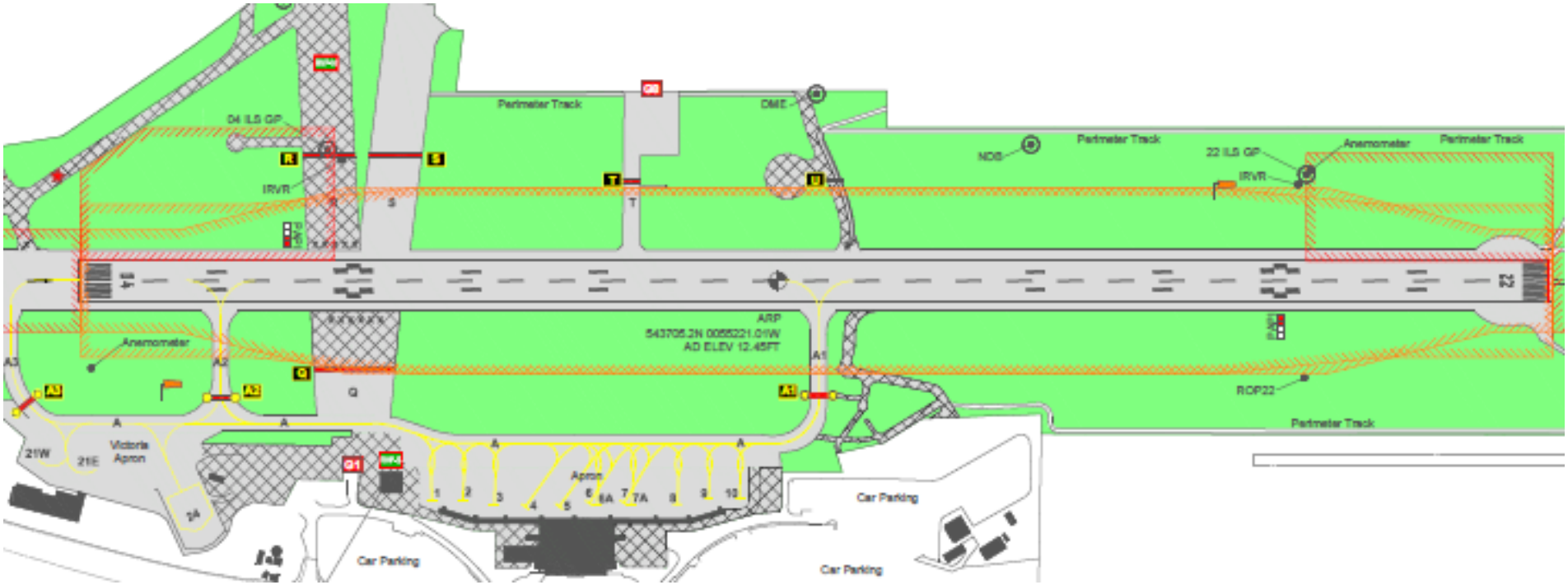
10. Monitoring of Standards

BCA, as the Airport Authority, operates a cautioning mechanism in airside areas.

Where individuals are found to be in breach of regulations, they may be subject to a Written Caution, which shall be formally recorded. This may also involve the issuing of penalty points

Airside Penalty Points will be issued in accordance with **AOI 05 – Airside Safety Regulation Scheme** which contains a sample Caution Slip.

ANNEX A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IRVR
Perimeter Track
D/ME
NDB
Perimeter Track
22 ILS GP
Anemometer
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IRVR
04
22
ARP
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AD ELEV 12.45FT
Anemometer
ROP22
Perimeter Track
21W
21E
Victoria
Apron
Apron
Car Parking
Car Parking
Car Parking

ANNEX B

‘Follow-me’ Procedures	
1.	OPS contact ATC and pass the following information: Aircraft registration, type, current stand, and destination e.g. Sierra.
2.	When pushback clearance is received, OPS pass this on to pushback crew (verbally). OPS then move to the ROSR (to halt vehicle movements) and when in place give ‘thumbs-up’ for the pushback to commence.
3.	When the pushback is complete and all equipment and personnel are clear of the aircraft, the pushback team signal to engineers and OPS. OPS now position their ops vehicle in front of the aircraft (so the vehicle is visible from the cockpit).
4.	When the engineers are ready to taxi they should signal to the ops vehicle with their taxi light.
5.	OPS will now request permission to escort aircraft to destination.
6.	On receiving positive clearance, OPS will illuminate the ‘Follow-me’ sign on top of the Ops vehicle and move off slowly. The aircraft will follow. The engineers must keep a listening watch on the frequency so they are aware of clearance i.e. holding point only, or full clearance to Sierra.
7.	Once both ops vehicle and aircraft are clear of the holding point the ops vehicle will call runway vacated. The airline engineers will self-position the aircraft in the circle provided.
8.	Engineers must follow the safety instructions detailed in AOI-07.
9.	OPS are not required to remain with the engineers during the engine runs.
10.	Engineers should contact OPS by telephone when the engine run is complete.
11.	OPS will position the ops vehicle in front of the aircraft and contact ATC for clearance to cross the runway to the allocated stand.
12.	Once positive clearance has been received the ‘follow-me’ sign will be switched on.
13.	The allocated stand should be checked for FOD and stand guidance activated where appropriate.
14.	Once aircraft is on stand OPS will report taxiway and runway vacated.
Exceptions	
15.	If this procedure is from stand 21 then the aircraft engineer will contact ATC and ask for start-up. Then follow points 4 – 14.
16.	If LVPs are in force, then ATC will refer to AOI-12 and MATS part 2.
17.	Overspeed checks may be carried out on the taxiway at the discretion of ATC.

Count of REGISTRATION	Column Labels		
Row Labels	HIGH	LOW	Grand Total
Jan	1	11	12
Feb	3	14	17
Mar	1	14	15
Apr	3	13	16
May		37	37
Jun		13	13
Jul	2	10	12
Aug		9	9
Sep	5	20	25
Oct	2	25	27
Nov	1	9	10
Dec	3	15	18
Grand Total	21	190	211

DATE	REGIS	START	FINISH TIME	STAND	POWER
02-Jan-23	EIFSL	12:24	12:29	6a	LOW
04-Jan-23	EIFSL	13:34	13:45	SIERRA	HIGH
05-Jan-23	GECOI	16:00	16:05	10	LOW
05-Jan-23	GECOI	17:50	17:55	10	LOW
06-Jan-23	EIGPO	19:15	19:20	02	LOW
07-Jan-23	EIFSK	19:40	19:45	24	LOW
07-Jan-23	EIGPP	19:15	19:20	01	LOW
07-Jan-23	GCMJN	19:25	19:30	02	LOW
17-Jan-23	GCMJN	06:35	06:40	02	LOW
17-Jan-23	GJECY	20:46	20:46	10	LOW
18-Jan-23	GEXTB	15:29	15:35	03	LOW
28-Jan-23	EIGPN	15:24	15:29	01	LOW
04-Feb-23	GCMJN	07:58	08:05	01	LOW
05-Feb-23	EIGPN	07:37	07:41	02	LOW
05-Feb-23	GECOI	14:13	14:23	09	LOW
07-Feb-23	GCMJN	14:16	14:36	SIERRA	HIGH
08-Feb-23	GCMJN	13:02	14:12	SIERRA	HIGH
08-Feb-23	GEXTB	13:38	14:13	10	LOW
08-Feb-23	GCMJN	15:07	15:31	SIERRA	HIGH
11-Feb-23	GCMJN	09:02	09:11	03	LOW
12-Feb-23	GCMJN	14:12	14:16	7a	LOW
13-Feb-23	GECOI	14:54	15:21	09	LOW
13-Feb-23	GEXTB	15:41	15:59	10	LOW
18-Feb-23	EIGPP	12:10	12:15	09	LOW
18-Feb-23	EIGPP	21:08	21:08	09	LOW
18-Feb-23	EIGPP	21:08	21:15	09	LOW
18-Feb-23	GCMJN	21:20	21:25	02	LOW
23-Feb-23	GCMJL	14:13	14:16	01	LOW
25-Feb-23	EIGPO	21:04	21:10	01	LOW
06-Mar-23	GCMJN	21:25	21:29	09	LOW
07-Mar-23	EIGPO	14:55	14:58	02	LOW
07-Mar-23	GCMJL	20:42	20:44	7a	LOW
07-Mar-23	GCMJL	20:42	20:45	7a	LOW
08-Mar-23	GCMJN	12:16	12:20	02	LOW
14-Mar-23	EIGPN	12:56	13:03	02	LOW
15-Mar-23	EIGPN	12:30	13:00	SIERRA	HIGH
20-Mar-23	GCMJN	19:01	19:06	02	LOW
23-Mar-23	GCMJN	06:40	06:48	7a	LOW
26-Mar-23	EIGPN	21:35	21:45	01	LOW

27-Mar-23	GCMJN	14:27	14:33	03	LOW
28-Mar-23	EIGPP	06:12	06:17	09	LOW
29-Mar-23	GCMJM	06:31	06:36	10	LOW
29-Mar-23	GCMJN	19:29	19:33	03	LOW
31-Mar-23	GCMJM	14:00	14:05	7a	LOW
04-Apr-23	GCMJJ	14:00	14:05	09	LOW
05-Apr-23	GCMMI	10:24	10:29	01	LOW
06-Apr-23	GCMJN	06:50	06:54	10	LOW
08-Apr-23	GCMJN	19:07	19:25	SIERRA	HIGH
09-Apr-23	EIGZV	21:45	21:54	10	LOW
10-Apr-23	EIGZV	14:05	14:49	SIERRA	HIGH
10-Apr-23	GCMMI	21:06	21:11	01	LOW
12-Apr-23	GCMMI	14:35	14:40	10	LOW
13-Apr-23	EIGZV	06:40	06:45	10	LOW
14-Apr-23	GCMJM	06:40	06:42	02	LOW
14-Apr-23	GEZBR	16:25	18:30	24	LOW
14-Apr-23	GEZBR	16:25	16:30	24	LOW
15-Apr-23	GCMJM	18:13	18:17	02	LOW
15-Apr-23	GCMJM	18:00	18:05	02	LOW
15-Apr-23	GCMJN	20:44	20:47	09	LOW
30-Apr-23	GCMJM	08:06	08:16	SIERRA	HIGH
01-May-23	EIGZV	06:40	06:45	03	LOW
02-May-23	EIGZV	21:20	21:24	09	LOW
03-May-23	GCMJL	14:17	14:23	02	LOW
03-May-23	GCMMI	18:00	18:05	01	LOW
04-May-23	GCMJL	06:18	06:21	03	LOW
06-May-23	EIGZV	10:45	10:48	03	LOW
07-May-23	GCMMI	06:55	06:59	6a	LOW
09-May-23	GCMJL	06:31	06:36	03	LOW
10-May-23	G-CMJ	06:29	06:35	03	LOW
12-May-23	EIGZV	17:25	17:31	24	LOW
12-May-23	GCMJJ	21:45	21:51	6a	LOW
13-May-23	GCMJJ	06:33	06:38	6a	LOW
13-May-23	GCMJJ	13:18	13:22	6a	LOW
14-May-23	GCMJJ	07:24	07:30	02	LOW
14-May-23	GCMJJ	12:18	12:24	01	LOW
14-May-23	GCMJJ	19:18	19:20	01	LOW
14-May-23	GCMJJ	21:56	22:00	01	LOW
15-May-23	GCMMI	19:55	20:05	03	LOW
16-May-23	GCMMI	06:15	06:19	6a	LOW
16-May-23	GCMMI	07:41	07:46	6a	LOW
16-May-23	GCMJN	11:43	11:50	02	LOW
17-May-23	GCMMI	07:26	07:29	10	LOW
17-May-23	GCMMI	09:55	10:00	10	LOW
17-May-23	GCMMI	09:54	10:01	10	LOW
17-May-23	GCMJJ	20:50	20:54	02	LOW
18-May-23	GCMMI	06:59	07:03	09	LOW
18-May-23	GCMJJ	18:49	18:55	02	LOW
20-May-23	GCMJJ	07:06	07:18	02	LOW
21-May-23	GCMJL	21:56	22:00	6a	LOW
22-May-23	GJAAM	14:01	14:08	21	LOW
23-May-23	GRMBH	14:11	14:17	21	LOW
24-May-23	GCMJL	06:59	07:04	02	LOW
24-May-23	GCMJL	08:36	08:46	02	LOW
24-May-23	DCNOV	10:31	10:33	21	LOW
26-May-23	GCMJM	06:21	06:27	09	LOW
28-May-23	GCMJL	08:58	09:00	01	LOW
30-May-23	GCMJN	15:20	15:25	10	LOW
07-Jun-23	GCMJL	15:12	15:17	10	LOW

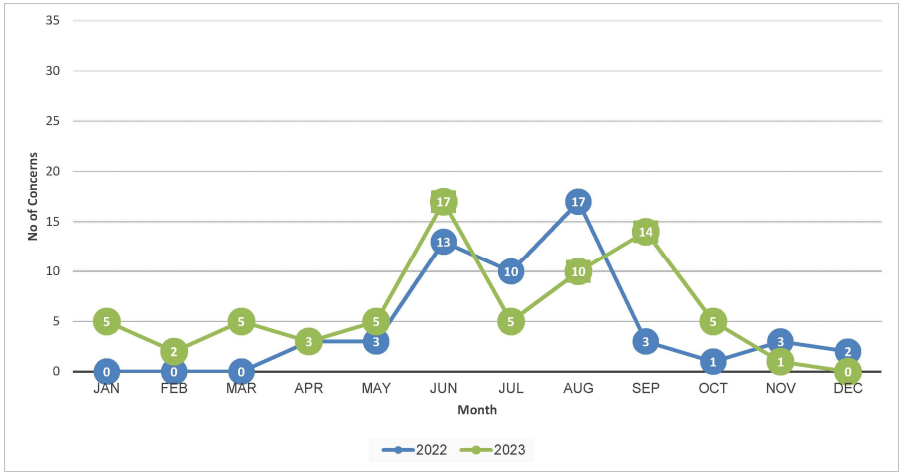
09-Jun-23	GCMJL	11:57	12:03	10	LOW
11-Jun-23	GCMJN	07:51	07:56	10	LOW
14-Jun-23	GCMJN	21:54	21:58	09	LOW
21-Jun-23	GCMJN	06:36	06:41	03	LOW
22-Jun-23	GCMJN	21:23	21:25	02	LOW
23-Jun-23	GCMJN	06:30	06:35	02	LOW
23-Jun-23	GCMMI	13:30	13:35	02	LOW
23-Jun-23	GCMMI	14:27	14:30	02	LOW
24-Jun-23	GCMMI	10:17	10:22	02	LOW
26-Jun-23	GCMMI	15:14	15:18	02	LOW
29-Jun-23	GCMMI	06:08	06:12	02	LOW
29-Jun-23	GCMJL	06:18	06:21	03	LOW
01-Jul-23	GCMJJ	08:40	08:49	6a	LOW
03-Jul-23	GCMMI	10:59	11:10	SIERRA	HIGH
05-Jul-23	GCMMI	09:35	09:50	01	LOW
12-Jul-23	GCMJL	20:30	20:35	02	LOW
18-Jul-23	GCMJJ	11:43	11:46	09	LOW
26-Jul-23	GCMMI	11:12	11:22	21	LOW
26-Jul-23	GCMMI	11:38	11:49	21	LOW
26-Jul-23	GCMMI	14:55	15:40	SIERRA	HIGH
26-Jul-23	GCMMI	16:30	16:35	10	LOW
26-Jul-23	GCMJN	19:46	19:50	09	LOW
27-Jul-23	GCMJN	06:10	06:18	01	LOW
29-Jul-23	GCMJL	06:14	06:18	02	LOW
08-Aug-23	GCMJN	21:43	21:49	03	LOW
13-Aug-23	GCMMI	07:18	07:25	02	LOW
13-Aug-23	GCMMI	21:10	21:13	03	LOW
19-Aug-23	GCMJN	08:50	08:55	10	LOW
19-Aug-23	GCMJN	10:20	10:22	7a	LOW
21-Aug-23	GCMJN	16:33	16:33	09	LOW
21-Aug-23	GCMJN	16:34	16:42	09	LOW
25-Aug-23	GCMMI	07:00	07:05	02	LOW
31-Aug-23	GCMMI	06:27	06:32	09	LOW
03-Sep-23	GCMMI	08:35	08:58	SIERRA	HIGH
04-Sep-23	GCMJN	06:34	06:45	02	LOW
05-Sep-23	GCMJL	07:24	07:29	02	LOW
05-Sep-23	GCMMI	13:21	13:25	10	LOW
08-Sep-23	GCMJN	13:32	13:38	02	LOW
08-Sep-23	GCMJN	15:36	15:45	RUNWAY	HIGH
08-Sep-23	GCMJN	15:31	15:44	RUNWAY	HIGH
13-Sep-23	GCMJL	17:25	17:40	21	LOW
16-Sep-23	GCMMI	06:30	06:35	7a	LOW
16-Sep-23	GCMJN	19:20	19:24	6a	LOW
19-Sep-23	GCMJJ	13:37	13:45	SIERRA	HIGH
22-Sep-23	GCMJN	21:21	21:25	03	LOW
23-Sep-23	GCMJN	06:18	06:23	03	LOW
25-Sep-23	GCMM	07:30	07:34	10	LOW
26-Sep-23	GCMM	14:16	14:20	24	LOW
28-Sep-23	GCMJN	10:04	10:23	6a	LOW
29-Sep-23	GCMJJ	12:05	12:08	09	LOW
29-Sep-23	GCMJJ	14:00	14:10	09	LOW
29-Sep-23	GCMJJ	15:20	15:25	09	LOW
29-Sep-23	GCMJJ	16:40	16:43	09	LOW
29-Sep-23	GCMJJ	18:23	18:28	09	LOW
29-Sep-23	GCMJJ	18:40	18:45	09	LOW
29-Sep-23	GCMJJ	19:12	19:17	09	LOW
30-Sep-23	GCMJL	08:28	08:31	02	LOW
30-Sep-23	GCMJL	08:44	08:45	RUNWAY	HIGH
01-Oct-23	GCMMI	11:33	11:38	03	LOW

01-Oct-23	GCMM	11:43	11:46	03	LOW
06-Oct-23	GCMM	11:07	11:18	09	LOW
07-Oct-23	GCMM	11:10	11:15	21	LOW
07-Oct-23	GCMM	16:55	17:01	01	LOW
08-Oct-23	GCMM	10:04	10:22	21	LOW
08-Oct-23	GCMM	08:00	08:30	21	LOW
08-Oct-23	GCMM	13:10	13:13	SIERRA	HIGH
10-Oct-23	GCMM	15:13	15:18	03	LOW
12-Oct-23	GCMJJ	12:08	12:14	01	LOW
12-Oct-23	G-CMJ	18:08	18:13	10	LOW
16-Oct-23	GCMM	15:04	15:08	09	LOW
17-Oct-23	GCMJN	13:42	13:51	10	LOW
18-Oct-23	GCMM	14:38	14:48	SIERRA	HIGH
19-Oct-23	GCMM	06:34	06:36	02	LOW
19-Oct-23	G-CMJ	14:12	14:18	10	LOW
19-Oct-23	GCMJN	17:21	17:34	10	LOW
19-Oct-23	GCMJJ	18:48	18:53	02	LOW
19-Oct-23	G-CMJ	18:43	19:12	02	LOW
23-Oct-23	GCMJN	18:58	19:04	21	LOW
23-Oct-23	GCMJJ	21:50	21:55	6a	LOW
24-Oct-23	GCMM	12:20	12:23	10	LOW
25-Oct-23	GCMJJ	19:55	20:05	10	LOW
26-Oct-23	GCMJL	06:49	06:54	03	LOW
27-Oct-23	GCMM	21:20	21:30	09	LOW
28-Oct-23	GCMJJ	16:50	17:00	6a	LOW
28-Oct-23	GCMM	19:55	20:00	09	LOW
05-Nov-23	G-CMJ	08:39	08:48	6a	LOW
11-Nov-23	GCMJL	18:34	18:39	01	LOW
11-Nov-23	GCMJL	18:44	18:49	01	LOW
16-Nov-23	GCMM	10:48	10:55	09	LOW
17-Nov-23	GCMM	10:29	10:37	10	LOW
18-Nov-23	G-CMM	18:29	18:42	09	LOW
19-Nov-23	GCMM	08:40	08:52	SIERRA	HIGH
21-Nov-23	G-CMM	19:38	19:46	01	LOW
23-Nov-23	GCMJL	06:30	06:35	03	LOW
28-Nov-23	GCMJL	15:47	15:51	10	LOW
01-Dec-23	GCMJN	22:30	22:35	03	LOW
04-Dec-23	GCMJN	15:51	15:56	01	LOW
04-Dec-23	GCMM	21:05	21:10	6a	LOW
06-Dec-23	GCMM	12:28	12:33	10	LOW
08-Dec-23	GCMM	21:55	22:00	01	LOW
12-Dec-23	GCMM	11:02	11:07	03	LOW
12-Dec-23	GCMJN	12:59	13:05	SIERRA	HIGH
13-Dec-23	GCMJJ	10:06	10:10	01	LOW
16-Dec-23	GCMM	17:51	17:58	09	LOW
19-Dec-23	GCMM	08:11	08:21	SIERRA	HIGH
19-Dec-23	GCMJJ	15:15	15:19	09	LOW
29-Dec-23	G-CMM	19:55	20:15	SIERRA	HIGH
30-Dec-23	G-CMM	20:48	21:04	02	LOW
30-Dec-23	GCMM	20:56	21:10	02	LOW
31-Dec-23	GCMJN	06:21	06:26	7a	LOW
31-Dec-23	GCMJJ	06:33	06:38	6a	LOW
31-Dec-23	GCMJJ	09:37	09:41	01	LOW
31-Dec-23	GCMJN	20:25	20:29	01	LOW

Appendix 6

Concerns by Type and Area, 2023																
Area	Bias over City / Flight paths	Low	Noise	Track keeping	After 2130	Disturbed Sleep / Pre-0700 / Early / Weekend	Aircraft Type / Size	Frequency / Too many flights	Ground Noise	Air Quality / Pollution	Specific Aircraft	Other	TOTAL Concerns by Area	% Concerns by Area	TOTAL Individuals logging Concerns By Area	Concern Area by Runway End
Comber / D'adee / Bangor / Dundonald				1									1	1%		Lough
Carnalea / Crawfordsburn													0	0%		Lough
Helen's Bay													0	0%		Lough
Craigavad													0	0%		Lough
Seahill / Cultra / Marino				1									1	1%	2	Lough
Holywood				25									25	22%	6	Lough
Kinnegar													0	0%		Lough
Knocknagoney / Old Holywood Road													0	0%		Lough
Sydenham / Inverary			1		1	1							3	3%		City
Ballymacarret													0	0%		City
City Centre													0	0%		City
Beersbridge / Albertbridge													0	0%		City
Newtownards Road / Ballymacarret / Connswater			1		15								16	14%	1	City
Donegall Road													0	0%		City
Ravenhill / Cregagh / Castlereagh	1												1	1%	1	City
Ormeau / Annadale	4				1								5	4%	3	City
Stranmillis / Malone					1								1	1%		City
Drumbeg / Tullyard													0	0%		City
G'wally / C'duff / N'breda / K'breda / Rosetta / Four Winds	1												1	1%	1	City
Not Given			1	4	12	1							18	16%	3	Not given
TOTALS	6	0	3	31	30	2	0	0	0	0	0	0	72	62%	17	
Percent	8%	0%	4%	43%	42%	3%	0%	0%	0%	0%	0%	0%	100%			

Concerns by Month		
	2022	2023
Jan	0	5
Feb	0	2
Mar	0	5
Apr	3	3
May	3	5
Jun	13	17
Jul	10	5
Aug	17	10
Sep	3	14
Oct	1	5
Nov	3	1
Dec	2	0
Total	55	72



Appendix 7 - Calibration Records 2023

Type	Model	Serial No.	Calibration Date	Certificate No.	Lab/On-site Calibration	Notes
Meter	NOR-118	32115	05/01/2021	36700	Lab calibration	Not in use
Pre-amp	GRAS-41AM	97213	05/01/2021	36700	Lab calibration (with 32115)	Not in use
Mic	GRAS-42AS	73645	05/01/2021	36700	Lab calibration (with 32115/97213)	Not in use
Meter	NOR-118	32112	17/01/2023	42986	Lab calibration	Not in use
Pre-amp	GRAS-41AM	56262	17/01/2023	42985	Lab calibration (with 32112)	Not in use
Mic	GRAS-42AS	69414	17/01/2023	42985	Lab calibration (with 32112/56262)	Not in use
Meter	NOR-118	32117	28/06/2022	41408	On-site calibration by [redacted]	In use at NMT1 Nettlefield; additonal on-site calibration by Topsonic 23/08/23
Pre-amp	GRAS-41AM	95491	28/06/2022	41408	On-site calibration by [redacted] (with 32117)	In use at NMT1 Nettlefield; additonal on-site calibration by Topsonic 23/08/23
Mic	GRAS-42AS	73643	28/06/2022	41408	On-site calibration by [redacted] (with 32117/95491)	In use at NMT1 Nettlefield; additonal on-site calibration by Topsonic 23/0823
Meter	NOR-118	32059	23/10/2023	U45706	Lab calibration (with 317389/168460	In use at NMT2 RFCA
Pre-amp	GRAS-41AM	317389	23/10/2023	45705	Lab calibration (with 32059/168460)	In use at NMT2 RFCA
Mic	GRAS-41AS	168460	23/10/2023	45705	Lab calibration (with 317389/32059	In use at NMT2 RFCA

Laboratory Location
Campbell Associates Ltd
5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, GB-CM6 1HD
Phone 01371 871030

Certificate of Calibration

Certificate number: **42985**

Test Object: **Measurement Microphone**

Producer: **GRAS**
Type: **41AS**
Serial number: **69414**
Customer: **Belfast City Airport**
Address: **George Best Belfast City Airport, Sydenham Bypass, Belfast. BT3 9JH.**
Contact Person: [redacted]
Order No: **POR013276**

Measurement Results	Sensitivity (dB re 1V/Pa)	Sensitivity (mV/Pa)	Capacitance (pF)
Measurement 1	*-27.69*	*41.24*	*21.75*
Measurement 2	*-27.70*	*41.20*	*21.79*
Measurement 3	*-27.71*	*41.16*	*21.79*
Result (Average):	***-27.70***	***41.20***	***21.78***
Expanded Uncertainty:	0.10		1.00
Degree of Freedom:	>100		>100
Coverage Factor:	2		2

The stated sensitivity is the pressure sensitivity at 250Hz, S_{250}, and is valid at reference conditions. The following correction factors have been applied during the measurement:
Pressure:0 dB/kPa Temperature:0 dB/°C Humidity:0 dB/%RH

Conditions	*Pressure kPa*	*Temperature °C*	*Humidty %RH*
Reference conditions	101.325	23	50
Measurement conditions	98.253 ± 0.042	22.9 ± 0.2	31.6 ± 1.3

The calibration test report shown on the next page gives details of the response at other frequencies relative to this 250 Hz reference sensitivity. Results ≥100 Hz are obtained using an electrostatic actuator as described in BS EN 61094-6 and those below 100 Hz are obtained in a reference pressure chamber. Detailed results are available from the calibration laboratory upon request.

The reported expanded uncertainty of measurements is based on a standard uncertainty multiplied by the coverage factor of k=2, providing a coverage probability of approximately 95%. Where the degrees of freedom are insufficient to maintain this confidence level, the coverage factor is increased to maintain this confidence level.

Calibration Dates:

Received date:	03/01/2023	Reviewed date:	19/01/2023
Calibration date:	17/01/2023	Issued date:	19/01/2023

Technicians: (Electronic certificate)

Calibrated by: [redacted]
Reviewed by: [redacted]

Certificate of Calibration

Continuation of Certificate number: 42985

Reference Calibrator: WSC1 (A) - Nor1253-24269
Measurement Record: K:\C A\Calibration\Nor-1504\Nor-1017 MicCal\GRAS41AS_69414_M1.nmf

Preconditioning
The equipment was preconditioned for more than 12 hours at the specified calibration temperature and humidity.

Instruments and Program
A complete list of instruments, hardware and software that have been used for this calibration is available from the calibration laboratory

Traceability
The measured values for sound pressure, frequency, voltage, capacitance, temperature, humidity and ambient pressure are traceable to an accredited national physical laboratory.

Observations
The differences between the two results at 100 Hz are within normal limits bearing in mind the different test methods and are taken into account in arriving at the uncertainties of measurement.

Method of Calibration
The open circuit sensitivity of the microphone has been determined at 250 Hz against a reference laboratory standard measurement microphone by insert voltage techniques using a laboratory standard sound calibrator as a transfer standard. The electrostatic actuator frequency response was then obtained for frequencies above 100 Hz as described in BS EN IEC 61094-6. In addition, where requested the optional free field frequency response over the range 2 – 100 Hz has been obtained using a pressure chamber; in this case the reference frequency is 100 Hz. All of these results and their associated uncertainties are detailed in the table on page 3 of this certificate. See the observations field below for details of any discrepancies between the 100 Hz results obtained via the electrostatic actuator and pressure chamber.

The overall uncertainty at any frequency σCombined,Fn may be obtained by combining the uncertainty of the open circuit sensitivity σS250 with the uncertainty of the actuator / or LF pressure response at any other frequency σAct,Fn where Fn is the uncertainty at the frequency of interest using the relationship:

$$\sigma_{Combined,Fn} = 2\sqrt{(\sigma^2_{S250} + \sigma^2_{ActFn})}$$

Appendix to this certificate
Where data is available from the microphone manufacturer to correct the actuator / pressure frequency response to obtain the random incidence and / or free field response it is shown in the appendix to this certificate. The uncertainty information relating to these corrections is the responsibility of the microphone manufacturer and when it is available the total uncertainty for the corrected frequency response at each point may then be obtained by including the correction uncertainty in the root-sum-square formula given above. These responses are outside the UKAS accredited scope, but are provided for information.

Observations

Continuation of Certificate number: **42985**

Numerical Results for Relative Frequency Response

Actuator Results					
Freq	Actuator	Uncert.	Freq	Actuator	Uncert.
Hz	dB re 250 Hz	dB	Hz	dB re 250 Hz	dB
100.0	0.02	0.21	5,010.70	-2.26	0.24
112.2	0.02	0.21	5,622.00	-2.66	0.24
125.9	0.02	0.21	6,307.90	-3.11	0.24
141.3	0.02	0.21	7,077.50	-3.71	0.24
158.5	0.01	0.21	7,940.90	-4.29	0.24
177.9	0.01	0.21	8,909.70	-5.01	0.48
199.6	0.01	0.21	9,996.70	-5.82	0.48
223.9	0.00	0.21	11,216	-6.83	0.48
251.2	Ref	0.21	12,585	-7.50	0.48
281.9	-0.01	0.21	14,120	-8.31	0.48
316.3	0.00	0.21	15,843	-8.96	0.48
354.9	-0.01	0.21	17,775	-9.77	0.70
398.2	-0.02	0.21	19,944	-10.90	0.70
446.7	-0.03	0.21	22377		0.90
501.2	-0.04	0.21	25107		0.90
562.4	-0.05	0.21	28170		0.90
631.0	-0.06	0.21	31607		0.90
708.0	-0.07	0.21	35463		0.90
794.4	-0.09	0.21	39790		0.90
891.3	-0.11	0.21	44644		0.90
1000.0	-0.14	0.21	50091		0.90
1122.0	-0.17	0.21	56202		1.20
1258.9	-0.20	0.21	63058		1.20
1412.5	-0.25	0.21	70752		1.20
1584.8	-0.31	0.21	79383		1.20
1778.1	-0.38	0.21	89068		1.20
1995.1	-0.47	0.21	99934		1.20
2238.5	-0.58	0.21	112126		-
2511.6	-0.71	0.21	125806		-
2818.0	-0.87	0.21	141154		-
3161.8	-1.06	0.21	158375		-
3547.5	-1.29	0.21	177696		-
3980.3	-1.56	0.21	199375		-
4465.9	-1.90	0.24	-		-

Low Frequency		
Freq	dB re 100 Hz	Uncert.
Hz		dB
2.0		0.7
2.2		0.7
2.5		0.7
2.8		0.7
3.2		0.7
3.6		0.7
4.0		0.7
4.5		0.7
5.0		0.7
5.6		0.7
6.3		0.7
7.1		0.7
8.0		0.7
8.9		0.7
10.0		0.7
11.2		0.7
12.6		0.7
14.1		0.7
15.9		0.7
17.8		0.7
20.0		0.7
22.4		0.7
25.1		0.7
28.2		0.7
31.6		0.7
35.5		0.7
39.8		0.7
44.7		0.7
50.1		0.7
56.3		0.7
63.1		0.7
70.8		0.7
79.5		0.7
89.2		0.7
100.0	Ref	0.7

Continuation of Certificate number: 42985

Appendix to certificate (not accredited). Random and Free Field Corrected Data

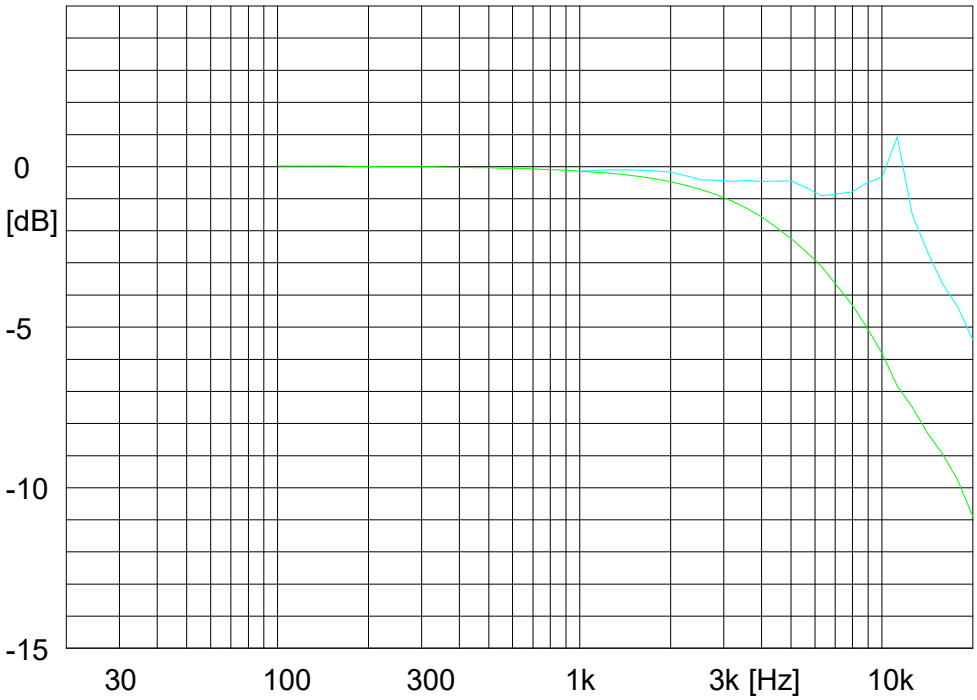
Corrected results, dB re 250 Hz					
Freq Hz	Random incidence corrected	Free field corrected	Freq Hz	Random incidence corrected	Free field corrected
100	0.02	0.02	5,010.70	-2.26	-0.46
112.2	0.02	0.02	5,622.00	-2.66	-0.66
125.9	0.02	0.02	6,307.90	-3.11	-0.91
141.3	0.02	0.02	7,077.50	-3.71	-0.86
158.5	0.01	0.01	7,940.90	-4.29	-0.79
177.9	0.01	0.01	8,909.70	-5.01	-0.51
199.6	0.01	0.01	9,996.70	-5.82	-0.32
223.9	0.00	0.00	11,216	-6.83	0.92
251.2	0.00	0.00	12,585	-7.50	-1.50
281.9	-0.01	-0.01	14,120	-8.31	-2.66
316.3	0.00	0.00	15,843	-8.96	-3.66
354.9	-0.01	-0.01	17,775	-9.77	-4.37
398.2	-0.02	-0.02	19,944	-10.90	-5.40
446.7	-0.03	-0.03	22,377		
501.2	-0.04	-0.04	25,107		
562.4	-0.05	-0.05	28,170		
631	-0.06	-0.06	31,607		
708	-0.07	-0.07	35,463		
794.4	-0.09	-0.09	39,790		
891.3	-0.11	-0.11	44,644		
1,000.00	-0.14	-0.14	50,091		
1,122.00	-0.17	-0.12	56,202		
1,258.90	-0.20	-0.10	63,058		
1,412.50	-0.25	-0.10	70,752		
1,584.80	-0.31	-0.11	79,383		
1,778.10	-0.38	-0.13	89,068		
1,995.10	-0.47	-0.17	99,934		
2,238.50	-0.58	-0.28	112,126		
2,511.60	-0.71	-0.41	125,806		
2,818.00	-0.87	-0.42	141,154		
3,161.80	-1.06	-0.46	158,375		
3,547.50	-1.29	-0.44	177,696		
3,980.30	-1.56	-0.46	199,375		
4,465.90	-1.90	-0.45	-		

The corrections used to produce these random and free field responses are published by the manufacturer and they are responsible for the accuracy of the data and for the associated uncertainties to be applied. Campbell Associates Limited use their best endeavours to ensure the accuracy of this data but are not responsible for any errors, omissions or for ensuring that the data is of the current issue.

If the actuator response was not measured for any frequency, then the corresponding cell in the above table will be blank; similarly, if correction data is not available from the manufacturer the cell will also be blank.
Correction data for frequencies below 100 Hz are not required

** End of Table Section **

Microphone Calibration Certificate



GRAS
Type: 41AS

Serial no: 69414

Sensitivity: 41.20 mV/Pa
-27.70 ±0.10 dB re. 1 V/Pa
Capacitance: 21.8 ±1.0 pF
Date: 17/01/2023

Signature:

Measurement conditions:

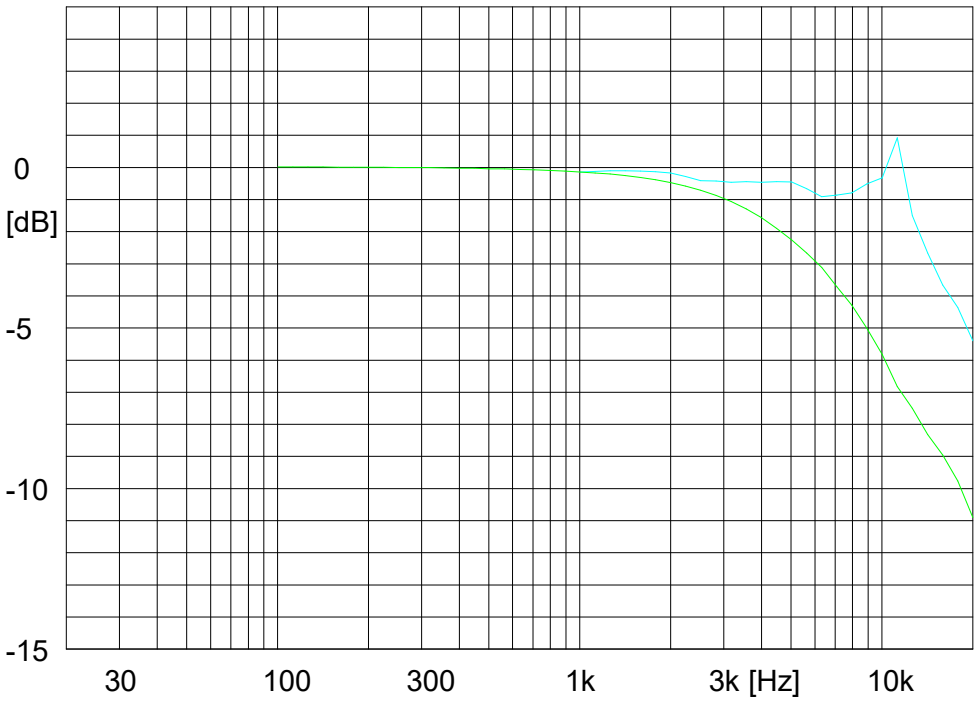
Polarisation voltage:	200.0 V
Pressure:	98.25 ±0.04 kPa
Temperature:	22.9 ±0.2 °C
Relative humidity:	31.6 ±1.3 %RH

Results are normalized to the reference conditions.

Free field response
Pressure (Actuator) response

Campbell Associates
www.campbell-associates.co.uk

Microphone Calibration Certificate



GRAS
Type: 41AS

Serial no: 69414

Sensitivity: 41.20 mV/Pa
-27.70 ±0.10 dB re. 1 V/Pa
Capacitance: 21.8 ±1.0 pF
Date: 17/01/2023

Signature:

Measurement conditions:

Polarisation voltage:	200.0 V
Pressure:	98.25 ±0.04 kPa
Temperature:	22.9 ±0.2 °C
Relative humidity:	31.6 ±1.3 %RH

Results are normalized to the reference conditions.

Free field response
Pressure (Actuator) response

Campbell Associates
www.campbell-associates.co.uk

Comment:

Laboratory Location
Campbell Associates Ltd
5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, GB-CM6 1HD
Phone 01371 871030

Certificate of Calibration

Certificate number: **45705**

Test Object: **Measurement Microphone**

Producer: **GRAS**
Type: **41AS**
Serial number: **168460**
Customer: **Belfast City Airport**
Address: **Airport Road, Belfast,**
Co. Antrim, Northern Ireland. BT3 9JH.
Contact Person: [redacted]
Order No: **291001**

Measurement Results	Sensitivity (dB re 1V/Pa)	Sensitivity (mV/Pa)	Capacitance (pF)
Measurement 1	*-27.27*	*43.29*	*21.68*
Measurement 2	*-27.27*	*43.29*	*21.79*
Measurement 3	*-27.27*	*43.31*	*21.80*
Result (Average):	***-27.27***	***43.30***	***21.76***
Expanded Uncertainty:	0.10		2.00
Degree of Freedom:	>100		>100
Coverage Factor:	2		2

The stated sensitivity is the pressure sensitivity at 250Hz, S_{250}, and is valid at reference conditions. The following correction factors have been applied during the measurement:
Pressure:0 dB/kPa Temperature:0 dB/°C Humidity:0 dB/%RH

Conditions	*Pressure kPa*	*Temperature °C*	*Humidty %RH*
Reference conditions	101.325	23	50
Measurement conditions	100.27 ± 0.040	21.8 ± 0.1	51.4 ± 0.7

The calibration test report shown on the next page gives details of the response at other frequencies relative to this 250 Hz reference sensitivity. Results ≥100 Hz are obtained using an electrostatic actuator as described in BS EN 61094-6 and those below 100 Hz are obtained in a reference pressure chamber. Detailed results are available from the calibration laboratory upon request.

The reported expanded uncertainty of measurements is based on a standard uncertainty multiplied by the coverage factor of k=2, providing a coverage probability of approximately 95%. Where the degrees of freedom are insufficient to maintain this confidence level, the coverage factor is increased to maintain this confidence level.

Calibration Dates:

Received date:	06/10/2023	Reviewed date:	23/10/2023
Calibration date:	23/10/2023	Issued date:	23/10/2023

Technicians: (Electronic certificate)

Calibrated by: [redacted]
Reviewed by: [redacted]

Certificate of Calibration

Continuation of Certificate number: 45705

Reference Calibrator: WSC9 (C) - Nor-1253.21816
Measurement Record: K:\C A\Calibration\Nor-1504\Nor-1017 MicCal\GRAS41AS_168460_M1.nmf

Preconditioning
The equipment was preconditioned for more than 12 hours at the specified calibration temperature and humidity.

Instruments and Program
A complete list of instruments, hardware and software that have been used for this calibration is available from the calibration laboratory

Traceability
The measured values for sound pressure, frequency, voltage, capacitance, temperature, humidity and ambient pressure are traceable to an accredited national physical laboratory.

Observations
The differences between the two results at 100 Hz are within normal limits bearing in mind the different test methods and are taken into account in arriving at the uncertainties of measurement.

Method of Calibration
The open circuit sensitivity of the microphone has been determined at 250 Hz against a reference laboratory standard measurement microphone by insert voltage techniques using a laboratory standard sound calibrator as a transfer standard. The electrostatic actuator frequency response was then obtained for frequencies above 100 Hz as described in BS EN IEC 61094-6. In addition, where requested the optional free field frequency response over the range 2 – 100 Hz has been obtained using a pressure chamber; in this case the reference frequency is 100 Hz. All of these results and their associated uncertainties are detailed in the table on page 3 of this certificate. See the observations field below for details of any discrepancies between the 100 Hz results obtained via the electrostatic actuator and pressure chamber.

The overall uncertainty at any frequency Combined,Fn may be obtained by combining the uncertainty of the open circuit sensitivity S250 with the uncertainty of the actuator / or LF pressure response at any other frequency Act,Fn where Fn is the uncertainty at the frequency of interest using the relationship:

$$\text{Combined,Fn} = 2\sqrt{(2\text{S250} + 2\text{ActFn})}$$

Appendix to this certificate
Where data is available from the microphone manufacturer to correct the actuator / pressure frequency response to obtain the random incidence and / or free field response it is shown in the appendix to this certificate. The uncertainty information relating to these corrections is the responsibility of the microphone manufacturer and when it is available the total uncertainty for the corrected frequency response at each point may then be obtained by including the correction uncertainty in the root-sum-square formula given above. These responses are outside the UKAS accredited scope, but are provided for information.

Observations

Continuation of Certificate number: **45705**

Numerical Results for Relative Frequency Response

Actuator Results					
Freq	Actuator	Uncert.	Freq	Actuator	Uncert.
Hz	dB re 250 Hz	dB	Hz	dB re 250 Hz	dB
100.0	0.02	0.21	5,010.70	-1.79	0.24
112.2	0.02	0.21	5,622.00	-2.18	0.24
125.9	0.02	0.21	6,307.90	-2.60	0.24
141.3	0.02	0.21	7,077.50	-3.10	0.24
158.5	0.02	0.21	7,940.90	-3.69	0.24
177.9	0.02	0.21	8,909.70	-4.42	0.48
199.6	0.03	0.21	9,996.70	-5.29	0.48
223.9	0.03	0.21	11,216	-6.21	0.48
251.2	Ref	0.21	12,585	-6.98	0.48
281.9	0.03	0.21	14,120	-7.80	0.48
316.3	0.02	0.21	15,843	-8.60	0.48
354.9	0.02	0.21	17,775	-9.49	0.70
398.2	0.02	0.21	19,944	-10.58	0.70
446.7	0.02	0.21	22377		0.90
501.2	0.01	0.21	25107		0.90
562.4	0.00	0.21	28170		0.90
631.0	0.01	0.21	31607		0.90
708.0	-0.01	0.21	35463		0.90
794.4	-0.02	0.21	39790		0.90
891.3	-0.04	0.21	44644		0.90
1000.0	-0.05	0.21	50091		0.90
1122.0	-0.08	0.21	56202		1.20
1258.9	-0.11	0.21	63058		1.20
1412.5	-0.14	0.21	70752		1.20
1584.8	-0.19	0.21	79383		1.20
1778.1	-0.24	0.21	89068		1.20
1995.1	-0.31	0.21	99934		1.20
2238.5	-0.40	0.21	112126		-
2511.6	-0.50	0.21	125806		-
2818.0	-0.62	0.21	141154		-
3161.8	-0.78	0.21	158375		-
3547.5	-0.97	0.21	177696		-
3980.3	-1.20	0.21	199375		-
4465.9	-1.47	0.24	-		-

Low Frequency		
Freq	dB re 100 Hz	Uncert.
Hz		dB
2.0		0.7
2.2		0.7
2.5		0.7
2.8		0.7
3.2		0.7
3.6		0.7
4.0		0.7
4.5		0.7
5.0		0.7
5.6		0.7
6.3		0.7
7.1		0.7
8.0		0.7
8.9		0.7
10.0		0.7
11.2		0.7
12.6		0.7
14.1		0.7
15.9		0.7
17.8		0.7
20.0		0.7
22.4		0.7
25.1		0.7
28.2		0.7
31.6		0.7
35.5		0.7
39.8		0.7
44.7		0.7
50.1		0.7
56.3		0.7
63.1		0.7
70.8		0.7
79.5		0.7
89.2		0.7
100.0	Ref	0.7

Continuation of Certificate number: 45705

Appendix to certificate (not accredited). Random and Free Field Corrected Data

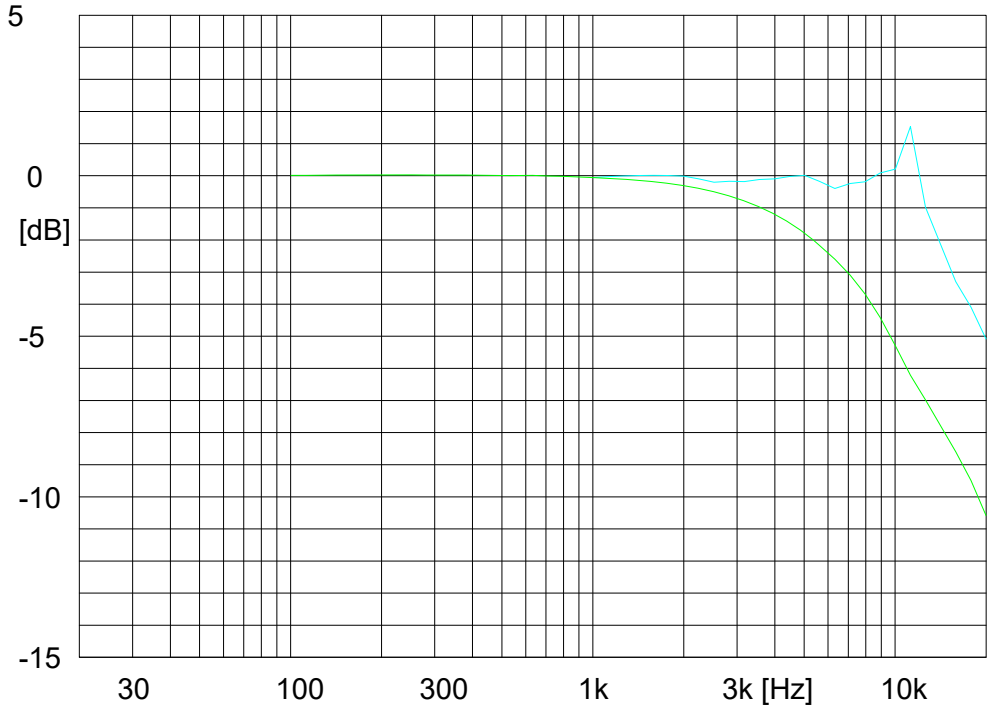
Corrected results, dB re 250 Hz					
Freq Hz	Random incidence corrected	Free field corrected	Freq Hz	Random incidence corrected	Free field corrected
100	0.02	0.02	5,010.70	-1.79	0.01
112.2	0.02	0.02	5,622.00	-2.18	-0.18
125.9	0.02	0.02	6,307.90	-2.60	-0.40
141.3	0.02	0.02	7,077.50	-3.10	-0.25
158.5	0.02	0.02	7,940.90	-3.69	-0.19
177.9	0.02	0.02	8,909.70	-4.42	0.08
199.6	0.03	0.03	9,996.70	-5.29	0.21
223.9	0.03	0.03	11,216	-6.21	1.54
251.2	0.03	0.03	12,585	-6.98	-0.98
281.9	0.03	0.03	14,120	-7.80	-2.15
316.3	0.02	0.02	15,843	-8.60	-3.30
354.9	0.02	0.02	17,775	-9.49	-4.09
398.2	0.02	0.02	19,944	-10.58	-5.08
446.7	0.02	0.02	22,377		
501.2	0.01	0.01	25,107		
562.4	0.00	0.00	28,170		
631	0.01	0.01	31,607		
708	-0.01	-0.01	35,463		
794.4	-0.02	-0.02	39,790		
891.3	-0.04	-0.04	44,644		
1,000.00	-0.05	-0.05	50,091		
1,122.00	-0.08	-0.03	56,202		
1,258.90	-0.11	-0.01	63,058		
1,412.50	-0.14	0.01	70,752		
1,584.80	-0.19	0.01	79,383		
1,778.10	-0.24	0.01	89,068		
1,995.10	-0.31	-0.01	99,934		
2,238.50	-0.40	-0.10	112,126		
2,511.60	-0.50	-0.20	125,806		
2,818.00	-0.62	-0.17	141,154		
3,161.80	-0.78	-0.18	158,375		
3,547.50	-0.97	-0.12	177,696		
3,980.30	-1.20	-0.10	199,375		
4,465.90	-1.47	-0.02	-		

The corrections used to produce these random and free field responses are published by the manufacturer and they are responsible for the accuracy of the data and for the associated uncertainties to be applied. Campbell Associates Limited use their best endeavours to ensure the accuracy of this data but are not responsible for any errors, omissions or for ensuring that the data is of the current issue.

If the actuator response was not measured for any frequency, then the corresponding cell in the above table will be blank; similarly, if correction data is not available from the manufacturer the cell will also be blank.
Correction data for frequencies below 100 Hz are not required

** End of Table Section **

Microphone Calibration Certificate



GRAS
Type: 41AS

Serial no: 168460

Sensitivity: 43.30 mV/Pa
-27.27 ±0.10 dB re. 1 V/Pa
Capacitance: 21.8 ±2.0 pF
Date: 23/10/2023

Signature:

Measurement conditions:

Polarisation voltage:	200.0 V
Pressure:	100.27 ±0.04 kPa
Temperature:	21.8 ±0.1 °C
Relative humidity:	51.4 ±0.7 %RH

Results are normalized to the reference conditions.

Free field response
Pressure (Actuator) response

Campbell Associates
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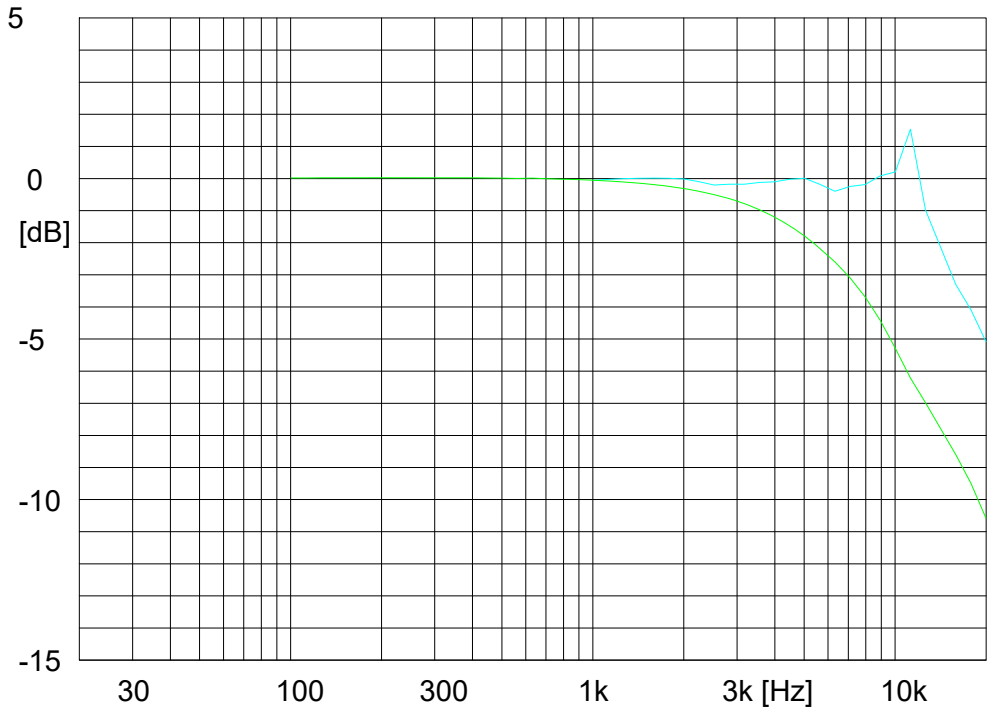
Microphone Calibration Certificate



GRAS
Type: 41AS

Serial no: 168460

Sensitivity: 43.30 mV/Pa
-27.27 ±0.10 dB re. 1 V/Pa
Capacitance: 21.8 ±2.0 pF
Date: 23/10/2023

Signature:

Measurement conditions:

Polarisation voltage:	200.0 V
Pressure:	100.27 ±0.04 kPa
Temperature:	21.8 ±0.1 °C
Relative humidity:	51.4 ±0.7 %RH

Results are normalized to the reference conditions.

Free field response
Pressure (Actuator) response

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Comment:

Laboratory Location
Campbell Associates Ltd
5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, GB-CM6 1HD
Phone 01371 871030

Certificate of Calibration and Conformance

Certificate number: **U45706**

Test Object: **Sound Level Meter, BS EN 60651 and or BS EN 60804 Class 1**

Producer: **Norsonic AS.**
Type: **118**
Serial number: **32059**
Customer: **Belfast City Airport**
Address: **Airport Road, Belfast,**
Co. Antrim, Northern Ireland. BT3 9JH.
Contact Person: [redacted]
Order No: **291001**

Introduction:
Calibration has been performed as set out in CA Technical Procedures which are based on the procedures for periodic verification of sound level meters as per the **Test Object** listed above. Results and conformance statement are overleaf and detailed results, where appropriate, are provided in the attached Measurement Report.

Tested:	*Producer*	*Type*	*Serial No*	*Certificate No*
Microphone	GRAS	41AS	168460	45705
Calibrator*	Norsonic	1256	125626986	Cal022-2023-17966
Preamplifier	GRAS	41AM	317389	Included

* The calibrator was complete with any required coupler for the microphone specified.

Additional items that have also been submitted for verification:

Wind shield	N/A
Attenuator	N/A
Extension cable	N/A

These items have been taken into account wherever appropriate.

Conditions	*Pressure kPa*	*Temperature °C*	*Humidity %RH*
Reference conditions	101.325	23	50
Measurement conditions	100.22 ±0.04	22.48 ±0.5	48.30 ±2.6

Calibration Dates:

Received date:	06/10/2023	Reviewed date:	23/10/2023
Calibration date:	23/10/2023	Issued date:	23/10/2023

Technicians: (Electronic certificate)

Calibrated by: [redacted]

Reviewed by: [redacted]

Certificate of Calibration and Conformance

Continuation of Certificate number: **U45706**

The statements of conformance and observation notes detailed in this certificate are made with reference to the following standards in respect of the calibration of the test object.

Manufactured:	**BS EN 60651 and or BS EN 60804**
Periodic Tests:	**BS 7580 Part 1:1997**
Pattern Evaluation:	**Not Applicable**

Conformance:
From markings on the sound level meter or by reference to the manufacturer's published literature it has been determined that the instrument submitted for verification was originally manufactured to the listed standard and similarly that the associated sound calibrator conforms to the BS EN IEC 60942 standard.

Measurement Summary:

Indication at the calibration check frequency - BS7580 #5.4	Passed
Noise test - BS 7580 #5.5.2	Passed
Level Linearity Test - BS 7580, #5.5.3	Passed
Frequency weightings: A Network - BS 7580 #5.5.4	Passed
Frequency weightings: C Network - BS 7580 #5.5.4	Passed
Frequency weightings: Z Network - BS 7580 #5.5.4	Passed
Time weightings F and S - BS 7580 #5.5.5	Passed
Peak response - BS 7580 #5.5.6	Passed
RMS accuracy - BS 7580 #5.5.7	Passed
Time weighting I - BS 7580 #5.5.8	Passed
Integrating Test : Time averaging - BS 7580 #5.5.9	Passed
Integrating Test : Pulse range - BS 7580 #5.5.10	Passed
Integrating Test : Sound exposure level - BS 7580 #5.5.11	Passed
Overload SPL Test - BS 7580 #5.5.12	Passed
Overload Leq Test - BS 7580 #5.5.12	Passed
Acoustic tests - BS 7580 #5.4 and 5.6	Passed
Summation of acoustic tests - BS 7580 #5.5.4	Passed

Calibration Method
The reference range, reference sound pressure level, primary indicator range, secondary indicator range, pulse range, linearity range and display range as specified by the manufacturer were used for the verification. The test object was set to A weighting and adjusted to read correctly in response to the associated sound calibrator the reading was derived from the calibrator calibration certificate and manufacturer's instruction manuals.
A measurement of the self noise of the sound level meter was then made using a dummy microphone having a capacitance of ±20% of the associated microphones self capacitance. The sound level meter was then tested, and its overall sensitivity adjusted, in accordance with the requirements of the listed standard . The acoustic calibration at 1 kHz was performed by application of a reference sound calibrator, whilst the tests at 125 Hz and 8k Hz were performed by the electrostatic actuator method. At the end of the test, the associated sound calibrator was reapplied to the sound level meter and the meter reading was recorded and is noted.

Statement of Conformance
The sound level meter in the configuration tested was found to comply with the requirements of the listed standard. The associated calibrator has been corrected for barometric pressure at the time of calibration in accordance with the relevant manufacturer's instructions

Observations
The sound level meter in the configuration tested conforms to the requirements of BS 7580 Part 1.

Certificate of Calibration and Conformance

Continuation of Certificate number: U45706

The final response obtained using the associated calibrator.(§5.6.3): 113.8dB(C) with GRAS-RA0009 s/n 1156 calibration adaptor with corrections of -0.2dB at 250Hz. This reading should be used henceforth to set up the sound level meter for field use.

The self-generated noise recorded in the test specified in § 5.5.2 was: (Below MSD)11.2dB(A), (Below MSD) 12.1dB(C) and (Below MSD) 17.1dB(Z) .

A stricter test than that specified in paragraphs 5.5.6 of BS7580:1997 has been used by verifying that the 10 ms reference pulse is also correct. The level uncertainty of the Laboratory's 1 kHz sound calibrator used during this verification is ± 0.1 dB.
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Decision Rule

Basic Meter Function - A PASS or PASSED statement indicates that the instrument conforms with the relevant accuracy requirements of the testing standard AND the expanded measurement uncertainty (k = 2 for approximately 95 % coverage probability) is no greater in magnitude than the accuracy requirements defined in BS-7580 Part 1:1997 standard

This certificate relates only to the items tested above.

** End of Certificate **

Measurement Results:

Indication at the calibration check frequency - BS7580 Clause 5.4

```
Reference level: 114.0 dB
Reference Range: 130 dB FS
Reference Frequency: 1000 Hz
Reference Calibrator: WSC9  (C) - Nor-1253.21816
Reference calibrator level: 124.04
Before calibration:
Environmental corrections: 0.00
Other corrections: -0.2
Notional level: 123.84
Calibrator level before adjustment: 123.8
After calibration:
Environmental corrections: 0.00
Other corrections: -0.2
Notional level: 123.84
Reference calibrator level after calibration: 123.8
Associated Calibrator: Norsonic - 1256 - 125626986
Associated calibrator level: 114.01
Initial level check:
Environmental corrections: 0.00
Other corrections: -0.20
Notional level: 113.81
Indicated level: 113.8
Final level statement:
Environmental corrections after calibration: 0.00
Other corrections: -0.2
Notional level: 113.81
Calibrator level after adjustment: 113.8
This value shall be used for adjusting the sound level meter in the future.
Test Passed
```

Noise test - BS 7580 Clause 5.5.2

The SLM is set to A-weighted and the most sensitive range setting. A dummy microphone is fitted, and the self-noise is measured on all available weighting networks over a 20 second period.

Network	Noise Level (dB)	Max allowed (dB)	Result code	
A	11.2	13.0	P	The value is less than MSD.
C	12.1	15.0	P	The value is less than MSD.
Z	17.1	25.0	P	The value is less than MSD.

Test Passed

Level Linearity Test - BS 7580, Clause 5.5.3

The LEQ linearity of the detector of the SLM is tested in 5 dB steps on the reference range. Additionally, the reference level and a level 2 dB above the bottom and 2 dB below the top of the other available measurement ranges are also measured.
The measurements on the reference range is repeated with SPL results, if possible
Test signal: 4 kHz sine wave.

Reference Value (dB)	Measured Value (dB)	Tol. Value (dB)	Error Value (dB)	Error Code
Measured at 4 kHz				
Full scale setting: 130dB				
The following measurements are LEQ measurements				
114.0	114.0	0.7	0.0	P
119.0	119.0	0.7	0.0	P
124.0	124.0	0.7	0.0	P
129.0	129.0	0.7	0.0	P
131.0	131.0	0.7	0.0	P
132.0	132.0	0.7	0.0	P
133.0	133.0	0.7	0.0	P
134.0	134.0	0.7	0.0	P
135.0	135.0	0.7	0.0	P
136.0	136.0	0.7	0.0	P
137.0	137.0	0.7	0.0	P
114.0	114.0	0.7	0.0	P
109.0	109.0	0.7	0.0	P
104.0	104.0	0.7	0.0	P
99.0	99.0	0.7	0.0	P
94.0	94.0	0.7	0.0	P
89.0	89.0	0.7	0.0	P
84.0	84.0	0.7	0.0	P
79.0	79.0	0.7	0.0	P
74.0	74.0	0.7	0.0	P
69.0	69.0	0.7	0.0	P
64.0	64.0	0.7	0.0	P
59.0	59.0	0.7	0.0	P
54.0	54.0	0.7	0.0	P
49.0	49.0	0.7	0.0	P
46.0	46.0	0.7	0.0	P
45.0	45.0	0.7	0.0	P
44.0	44.0	0.7	0.0	P
43.0	43.0	0.7	0.0	P
42.0	42.0	0.7	0.0	P
41.0	41.0	0.7	0.0	P
40.0	40.0	0.7	0.0	P
Full scale setting: 130dB				
114.0	114.0	0.7	0.0	P
135.0	135.0	0.7	0.0	P
40.0	40.0	0.7	0.0	P
Full scale setting: 130dB				
The following measurements are SPL measurements				
114.0	114.0	0.7	0.0	P
119.0	119.0	1.0	0.0	P
124.0	124.0	1.0	0.0	P
129.0	129.0	1.0	0.0	P
131.0	131.0	1.0	0.0	P
132.0	132.0	1.0	0.0	P

Level Linearity Test - BS 7580, Clause 5.5.3

Reference Value (dB)	Measured Value (dB)	Tol. Value (dB)	Error Value (dB)	Error Code
133.0	133.0	1.0	0.0	P
134.0	134.0	1.0	0.0	P
135.0	135.0	1.0	0.0	P
136.0	136.0	1.0	0.0	P
137.0	137.0	1.0	0.0	P
114.0	114.0	0.7	0.0	P
109.0	109.0	0.7	0.0	P
104.0	104.0	0.7	0.0	P
99.0	99.0	0.7	0.0	P
94.0	94.0	0.7	0.0	P
89.0	89.0	0.7	0.0	P
84.0	84.0	0.7	0.0	P
79.0	79.0	0.7	0.0	P
74.0	74.0	0.7	0.0	P
69.0	69.0	0.7	0.0	P
64.0	64.0	0.7	0.0	P
59.0	59.0	0.7	0.0	P
54.0	54.0	0.7	0.0	P
49.0	49.0	0.7	0.0	P
46.0	46.0	0.7	0.0	P
45.0	45.0	0.7	0.0	P
44.0	44.0	0.7	0.0	P
43.0	43.0	0.7	0.0	P
42.0	42.0	0.7	0.0	P
41.0	41.0	0.7	0.0	P
40.0	40.0	0.7	0.0	P

Test Passed

Frequency weightings: A Network - BS 7580 Clause 5.5.4

The SLM is set to its reference range and tested relative to 1k Hz at the reference SPL. All available networks are tested. Tolerances given here are for information only and relate to complete instrument, see test §5.5.4. for complete instrument data to which these tolerances relate.

Freq (Hz)	Ref (dB)	Meas. Value (dB)	Tolerance HiLim (dB)	Tolerance LoLim (dB)	Result Value (dB)	Code	
31.6	114.0	113.9	1.5	-1.5	-0.1	P	Adjusted 25.4dB **
63.1	114.0	114.0	1.5	-1.5	0.0	P	Adjusted 12.2dB **
125.9	114.0	113.9	1.0	-1.0	-0.1	P	
251.2	114.0	113.9	1.0	-1.0	-0.1	P	
501.2	114.0	113.9	1.0	-1.0	-0.1	P	
1000.0	114.0	113.9	1.0	-1.0	-0.1	P	
1995.3	114.0	113.9	1.0	-1.0	-0.1	P	
3981.1	114.0	113.9	1.0	-1.0	-0.1	P	
7943.3	114.0	114.0	1.5	-3.0	0.0	P	
12589.3	114.0	114.0	3.0	-6.0	0.0	P	

** indicates that level is adjusted because of limited dynamic range.

Test Passed

Frequency weightings: C Network - BS 7580 Clause 5.5.4

The SLM is set to its reference range and tested relative to 1k Hz at the reference SPL. All available networks are tested. Tolerances given here are for information only and relate to complete instrument, see test §5.5.4. for complete instrument data to which these tolerances relate.

Freq (Hz)	Ref (dB)	Meas. Value (dB)	Tolerance HiLim (dB)	Tolerance LoLim (dB)	Result Value (dB)	Code
31.6	114.0	114.0	1.5	-1.5	0.0	P
63.1	114.0	113.9	1.5	-1.5	-0.1	P
125.9	114.0	114.0	1.0	-1.0	0.0	P
251.2	114.0	113.9	1.0	-1.0	-0.1	P
501.2	114.0	114.0	1.0	-1.0	0.0	P
1000.0	114.0	113.9	1.0	-1.0	-0.1	P
1995.3	114.0	113.9	1.0	-1.0	-0.1	P
3981.1	114.0	113.9	1.0	-1.0	-0.1	P
7943.3	114.0	114.0	1.5	-3.0	0.0	P
12589.3	114.0	113.9	3.0	-6.0	-0.1	P

Test Passed

Frequency weightings: Z Network - BS 7580 Clause 5.5.4

The SLM is set to its reference range and tested relative to 1k Hz at the reference SPL. All available networks are tested. Tolerances given here are for information only and relate to complete instrument, see test §5.5.4. for complete instrument data to which these tolerances relate.

Freq (Hz)	Ref (dB)	Meas. Value (dB)	Tolerance HiLim (dB)	Tolerance LoLim (dB)	Result Value (dB)	Code
31.6	114.0	113.8	1.5	-1.5	-0.2	P
63.1	114.0	113.9	1.5	-1.5	-0.1	P
125.9	114.0	113.9	1.0	-1.0	-0.1	P
251.2	114.0	113.9	1.0	-1.0	-0.1	P
501.2	114.0	113.9	1.0	-1.0	-0.1	P
1000.0	114.0	113.9	1.0	-1.0	-0.1	P
1995.3	114.0	113.9	1.0	-1.0	-0.1	P
3981.1	114.0	113.9	1.0	-1.0	-0.1	P
7943.3	114.0	113.9	1.5	-3.0	-0.1	P
12589.3	114.0	113.9	3.0	-6.0	-0.1	P

Test Passed

Time weightings F and S - BS 7580 Clause 5.5.5

A continuous sine wave is applied to the SLM and adjusted to give an indication 4 dB below upper limit of the primary indicator range. Then onset transient characteristics are tested using a single sine wave burst with an amplitude equal to the continuous signal and a duration of T(ms).
Test signal: Single Sine Wave Burst of 2 kHz.

Time Constant	Burst Duration (ms)	Ref. Value (dB)	Measured Value (dB)	Tolerance Value (dB)	Result Value (dB)	
Fast	200	112.0	112.0	1.0	0.0	P
Slow	500	108.9	109.0	1.0	0.1	P

Test Passed

Peak response - BS 7580 Clause 5.5.6

Rectangular wave pulses are used to test the peak response. The response of a 100 micro second pulse shall not differ from the response of a 10 milliseconds pulse by more than 2dB.

Pulse Duration	Pulse Polarity	Ref. Value (dB)	Meas. Value (dB)	Tolerance Value (dB)	Error values Abs. (dB)	Error values Rel. (dB)	Result Code
10ms	+	116.0	116.6		0.6		P
0.1ms	+	116.0	115.6	2.0	-0.4	-1.0	P
10ms	-	116.0	116.6		0.6		P
0.1ms	-	116.0	115.7	2.0	-0.3	-0.9	P

The results have been compensated for the impulse response of
the C-weighting network.
Test Passed

RMS accuracy - BS 7580 Clause 5.5.7

The instrument is set to time constant Slow. A continuous sine wave (2kHz) is applied to the SLM and adjusted to give an indication 2 dB below upper limit of the primary indicator range The signal is replaced by a sequence of tone bursts (CF=3) with a repetition rate of 40Hz.

	Crest Factor	Ref. Value (dB)	Meas. Value (dB)	Tolerance norm (dB)	Result Value (dB)	
F	3	115.0	115.1	0.5	0.1	P
F	3	115.0	114.8	0.5	-0.2	P
S	3	115.0	114.7	0.5	-0.3	P

Test Passed

Time weighting I - BS 7580 Clause 5.5.8

A continuous sine wave (2 kHz) is applied to the SLM and adjusted to give an indication at the upper limit of the primary indicator range. The onset transient characteristics are tested. First, a single sine wave burst with the amplitude equal to the continuous signal and the duration of 5 ms is used. Then, the same burst is repeated with a frequency of 100 Hz.

Burst type	Reference Value (dB)	Measured Value (dB)	Tolerance norm (dB)	Result Value (dB)	
5 ms single burst	108.2	106.9	2.0	-1.3	P
100Hz repeated	114.3	113.9	1.0	-0.4	P

Test Passed

Integrating Test : Time averaging - BS 7580 Clause 5.5.9

The SLM is set to the reference range. The signal generator is adjusted to give a 4 kHz sine wave with an rms level 30dB below the top of the Linearity range. The sine wave is replaced by a sequence of tone burst with the same frequency and the same rms level. For type 1 and 0 instruments, the burst duty factor (the distance between each burst) is increased, while the amplitude is increased to keep the same equivalent rms level. 1 minute, 6 minutes and 1 hour respectively.
Test signal: Continuous sine wave burst of 4kHz

Burst Duration (ms)	Ref. Value (dB)	Tolerance norm (dB)	Meas. Value (dB)	Error (LeqA) (dB)	
1/10^3	107.0	1.0	106.9	-0.1	P
1/10^4	97.0	1.0	96.7	-0.3	P

Test Passed

Integrating Test : Pulse range - BS 7580 Clause 5.5.10

Pulse handling is tested on the reference range using a 10 ms tone burst (of 4 kHz) during an integration period of 10 seconds superimposed on a low level background signal. The resulting A-weighted Leq shall correspond to table II of BS EN IEC 60804. The test is repeated on the upper end of the linearity range.

Burst Duration (ms)	Ref. Value (dB)	Measured Value (dB)	Tolerance Norm (dB)	Result Value (dB)	
10	52.0	51.7	1.7	-0.3	P
10	102.0	102.0	1.7	0.0	P

Test Passed

Integrating Test : Sound exposure level - BS 7580 Clause 5.5.11

Pulse handling is tested on the reference range using a 10 ms tone burst (of 4 kHz) during an integration period of 10 seconds. The A-weighted SEL of the burst shall correspond to table II of BS EN 60804. The test is repeated on the lower end of the pulse range.

Burst Duration (ms)	Ref. Value (dB)	Measured Value (dB)	Tolerance Norm (dB)	Result Value (dB)	
10	62.0	62.0	1.7	0.0	P
10	112.0	112.0	1.7	0.0	P

Test Passed

Overload SPL Test - BS 7580 Clause 5.5.12

The SLM is set to reference range. A continuous tone burst is applied and adjusted until overload occurs. Then signal is reduced to give an on-scale indication. The level is further reduced 3 dB and the SLM shall indicate correctly within the tolerances given in table XIII of BS EN 60651.

	Ref. Value (dB)		Measured Value (dB)	Tolerance Norm (dB)	Result Value (dB)	
SPL CF3	130.7	-3	127.8	1.0	0.1	P

Overload occurred at: 131.7dB RMS

```
Overload SPL Test - BS 7580 Clause 5.5.12
              Ref.   Measured   Tolerance   Result
             Value     Value      Norm      Value
              (dB)      (dB)      (dB)      (dB)

Test Passed
```

Overload Leq Test - BS 7580 Clause 5.5.12

The SLM is set to Leq. A 1 ms pulse of 4 kHz on a low level background is applied and adjusted until overload occurs. Then the level is reduced 1 dB. A single tone burst is then applied and the Leq,10s measured. The result shall be within the tolerances given in table II of BS EN IEC 60804.

```
              Ref.   Measured   Tolerance   Result
             Value     Value      Norm      Value
              (dB)      (dB)      (dB)      (dB)
LEQ 1ms       97.1      97.0       2.2      -0.1   P
Overload occurred approximately at: 141.1 dB (peak level)
Test Passed
```

Acoustic tests - BS 7580 Clause 5.4 and 5.6

```
The sound level meter was initially calibrated with the associated calibrator.(§5.4)
Reference level:                        114.01 dB
Ambient corrections:                      0.00 dB
Pressure to free field correction:       -0.20 dB
Corrected level:                        113.81 dB
Indicated level:                         113.8 dB
The sound level meter was tested at 125 Hz. (§5.6.2)
Reference level:                          91.3 dB
Ambient corrections:                           dB
Pressure to free field correction:        0.00 dB
Case reflections:                              dB
Linearity error:                               dB
Weighting correction:                     0.17 dB
Windscreen corrections:                        dB
Notional level:                          91.13 dB
Indicated level:                          91.2 dB
Tolerance:                               +/- 1 dB
Error:                                    0.07 dB
The sound level meter was tested at 1k Hz. (§5.6.2)
Reference level:                          91.3 dB
Ambient corrections:                           dB
Pressure to free field correction:        0.00 dB
Case reflections:                              dB
Linearity error:                               dB
Weighting correction:                     0.00 dB
Windscreen corrections:                        dB
Notional level:                          91.30 dB
Indicated level:                          91.3 dB
Tolerance:                               +/- 1 dB
Error:                                    0.00 dB
The sound level meter was tested at 4k Hz. (§5.6.2)
Reference level:                          91.3 dB
Ambient corrections:                           dB
Pressure to free field correction:        1.10 dB
```

Acoustic tests - BS 7580 Clause 5.4 and 5.6

Case reflections:		dB
Linearity error:		dB
Weighting correction:	0.82	dB
Windscreen corrections:		dB
Notional level:	89.38	dB
Indicated level:	89.2	dB
Tolerance:	+/- 1	dB
Error:	-0.18	dB

The sound level meter was tested at 8k Hz. (§5.6.2)

Reference level:	91.3	dB
Ambient corrections:		dB
Pressure to free field correction:	3.50	dB
Case reflections:		dB
Linearity error:		dB
Weighting correction:	3.01	dB
Windscreen corrections:		dB
Notional level:	84.79	dB
Indicated level:	84.6	dB
Tolerance:	+1.5; -3	dB
Error:	-0.19	dB

The measurement was performed using an electrostatic actuator method.
Response: Free field
Test Passed

Summation of acoustic tests - BS 7580 Clause 5.5.4

The microphone data are measured using electrostatic actuator.

SLM: A-Weighted results

Freq. (Hz)	SLM (dB)	Mic. (dB)	CR. (dB)	WS. (dB)	Tol. (dB)	Dev. (dB)
31.5	0.0	0.0			+-1.5	0.0
63	0.1	0.0			+-1.5	0.1
125	0.0	0.0			+-1.0	0.0
250	0.0	0.0			+-1.0	0.0
500	0.0	0.0			+-1.0	0.0
1 k	0.0	-0.1			+-1.0	-0.1
2 k	0.0	0.0			+-1.0	0.0
4 k	0.0	-0.1			+-1.0	-0.1
8 k	0.1	-0.2			+1.5,-3	-0.1
12.5 k	0.1	-1.0			+3,-6	-0.9

SLM: C-Weighted results

Freq. (Hz)	SLM (dB)	Mic. (dB)	CR. (dB)	WS. (dB)	Tol. (dB)	Dev. (dB)
31.5	0.1	0.0			+-1.5	0.1
63	0.0	0.0			+-1.5	0.0
125	0.1	0.0			+-1.0	0.1
250	0.0	0.0			+-1.0	0.0
500	0.1	0.0			+-1.0	0.1
1 k	0.0	-0.1			+-1.0	-0.1
2 k	0.0	0.0			+-1.0	0.0
4 k	0.0	-0.1			+-1.0	-0.1
8 k	0.1	-0.2			+1.5,-3	-0.1
12.5 k	0.0	-1.0			+3,-6	-1.0

SLM: Z-Weighted results

Freq. (Hz)	SLM (dB)	Mic. (dB)	CR. (dB)	WS. (dB)	Tol. (dB)	Dev. (dB)

Summation of acoustic tests - BS 7580 Clause 5.5.4

31.5	-0.1	0.0	+-1.5	-0.1
63	0.0	0.0	+-1.5	0.0
125	0.0	0.0	+-1.0	0.0
250	0.0	0.0	+-1.0	0.0
500	0.0	0.0	+-1.0	0.0
1 k	0.0	-0.1	+-1.0	-0.1
2 k	0.0	0.0	+-1.0	0.0
4 k	0.0	-0.1	+-1.0	-0.1
8 k	0.0	-0.2	+1.5,-3	-0.2
12.5 k	0.0	-1.0	+3,-6	-1.0

Test Passed
The overall frequency response of the sound level meter and microphone response has shown to conform with the requirements in §6 of the BSEN 60651 and §5.5.4 in BS 7580 Part 1.

*** End of results ***

Laboratory Location
Campbell Associates Ltd
5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, GB-CM6 1HD
Phone 01371 871030

Certificate of Calibration

Certificate number: **U42986**

Test Object: **Sound Level Meter, BS EN 60651 and or BS EN 60804 Class 1**

Producer: **Norsonic AS.**
Type: **118**
Serial number: **32112**
Customer: **Belfast City Airport**
Address: **George Best Belfast City Airport, Sydenham Bypass, Belfast. BT3 9JH.**
Contact Person: [redacted]
Order No: **POR013276**

Introduction:
Calibration has been performed as set out in CA Technical Procedures which are based on the procedures for periodic verification of sound level meters as per the **Test Object** listed above. Results and conformance statement are overleaf and detailed results, where appropriate, are provided in the attached Measurement Report.

Tested:	*Producer*	*Type*	*Serial No*	*Certificate No*
Microphone	GRAS	41AS	69414	42985
Calibrator*	Norsonic	1253_250Hz	21816	U42378
Preamplifier	GRAS	41AM	56262	Included

* The calibrator was complete with any required coupler for the microphone specified.

Additional items that have also been submitted for verification:

Wind shield	N/A
Attenuator	N/A
Extension cable	N/A

These items have been taken into account wherever appropriate.

0

Conditions	*Pressure kPa*	*Temperature °C*	*Humidity %RH*
Reference conditions	101.325	23	50
Measurement conditions	98.31 ±0.04	23.18 ±0.2	31.80 ±0.75

Calibration Dates:

Received date:	03/01/2023	Reviewed date:	19/01/2023
Calibration date:	17/01/2023	Issued date:	19/01/2023

Technicians: (Electronic certificate)

Calibrated by: [redacted]

Reviewed by: [redacted]

Certificate of Calibration

Continuation of Certificate number: **U42986**

The statements of conformance and observation notes detailed in this certificate are made with reference to the following standards in respect of the calibration of the test object.

Manufactured:	**BS EN 60651 and or BS EN 60804**
Periodic Tests:	**BS 7580 Part 1:1997**
Pattern Evaluation:	**Not Applicable**

Conformance:
From markings on the sound level meter or by reference to the manufacturer's published literature it has been determined that the instrument submitted for verification was originally manufactured to the listed standard and similarly that the associated sound calibrator conforms to the BS EN IEC 60942 standard.

Measurement Summary:

Indication at the calibration check frequency - BS7580 #5.4	Passed
Noise test - BS 7580 #5.5.2	Passed
Level Linearity Test - BS 7580, #5.5.3	Passed
Frequency weightings: A Network - BS 7580 #5.5.4	Passed
Frequency weightings: C Network - BS 7580 #5.5.4	Passed
Frequency weightings: Z Network - BS 7580 #5.5.4	Passed
Time weightings F and S - BS 7580 #5.5.5	Passed
Peak response - BS 7580 #5.5.6	Passed
RMS accuracy - BS 7580 #5.5.7	Passed
Time weighting I - BS 7580 #5.5.8	Passed
Integrating Test : Time averaging - BS 7580 #5.5.9	Passed
Integrating Test : Pulse range - BS 7580 #5.5.10	Passed
Integrating Test : Sound exposure level - BS 7580 #5.5.11	Passed
Overload SPL Test - BS 7580 #5.5.12	Passed
Overload Leq Test - BS 7580 #5.5.12	Passed
Acoustic tests - BS 7580 #5.4 and 5.6	Passed
Summation of acoustic tests - BS 7580 #5.5.4	Passed

Comments
Correct level with associated calibrator is 124.2dB(C).

Calibration Method
The reference range, reference sound pressure level, primary indicator range, secondary indicator range, pulse range, linearity range and display range as specified by the manufacturer were used for the verification. The test object was set to A weighting and adjusted to read correctly in response to the associated sound calibrator the reading was derived from the calibrator calibration certificate and manufacturer's instruction manuals.
A measurement of the self noise of the sound level meter was then made using a dummy microphone having a capacitance of ±20% of the associated microphones self capacitance. The sound level meter was then tested, and its overall sensitivity adjusted, in accordance with the requirements of the listed standard . The acoustic calibration at 1 kHz was performed by application of a reference sound calibrator, whilst the tests at 125 Hz and 8k Hz were performed by the electrostatic actuator method. At the end of the test, the associated sound calibrator was reapplied to the sound level meter and the meter reading was recorded and is noted.

Statement of Conformance
The sound level meter in the configuration tested was found to comply with the requirements of the listed standard. The associated calibrator has been corrected for barometric pressure at the time of calibration in accordance with the relevant manufacturer's instructions

Observations
The final response obtained using the associated calibrator.(§5.6.3): 124.2dB(C) with GRAS-RA0041 s/n 546 calibration adaptor with corrections of +0.0dB at 250Hz. This reading should be used henceforth to set up the sound level meter for field use.

Certificate of Calibration

Continuation of Certificate number: U42986

The self-generated noise recorded in the test specified in § 5.5.2 was: 12.3 (Below MSD)dB(A), 13.7 (Below MSD)dB(C) and 18.4dB(Lin).

The final response obtained using the associated calibrator.(§5.6.3): 124.2dB(C).

This reading should be used henceforth to set up the sound level meter for field use.

A stricter test than that specified in paragraphs 5.5.6 of BS7580:1997 has been used by verifying that the 10 ms reference pulse is also correct. The level uncertainty of the Laboratory's 1 kHz sound calibrator used during this verification is ± 0.1 dB.
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS

Decision Rule
Basic Meter Function - A PASS or PASSED statement indicates that the instrument conforms with the relevant accuracy requirements of the testing standard AND the expanded measurement uncertainty (k = 2 for approximately 95 % coverage probability) is no greater in magnitude than the accuracy requirements defined in BS-7580 Part 1:1997 standard

This certificate relates only to the items tested above.

** End of Certificate **

Measurement Results:

Indication at the calibration check frequency - BS7580 Clause 5.4

```
Reference level: 114.0 dB
Reference Range: 130 dB FS
Reference Frequency: 1000 Hz
Reference Calibrator: WSC1   (A) - Nor1253-24269
Reference calibrator level: 123.98
Before calibration:
Environmental corrections: 0.00
Other corrections: 0.00
Notional level: 123.98
Calibrator level before adjustment: 124.1
After calibration:
Environmental corrections: 0.00
Other corrections: 0.00
Notional level: 123.98
Reference calibrator level after calibration: 124.1
Associated Calibrator: Norsonic - 1253_250Hz - 21816
Associated calibrator level: 124.00
Initial level check:
Environmental corrections: 0.00
Other corrections: 0.00
Notional level: 124.00
Indicated level: 124.2
Final level statement:
Environmental corrections after calibration: 0.00
Other corrections: 0.00
Notional level: 124.00
Calibrator level after adjustment: 124.2
This value shall be used for adjusting the sound level meter in the future.
Test Passed
```

Noise test - BS 7580 Clause 5.5.2

The SLM is set to A-weighted and the most sensitive range setting. A dummy microphone is fitted, and the self-noise is measured on all available weighting networks over a 20 second period.

Network	Noise Level (dB)	Max allowed (dB)	Result code	
A	12.3	13.0	P	The value is less than MSD.
C	13.7	15.0	P	The value is less than MSD.
Z	18.4	25.0	P	The value is less than MSD.

Test Passed

Level Linearity Test - BS 7580, Clause 5.5.3

The LEQ linearity of the detector of the SLM is tested in 5 dB steps on the reference range. Additionally, the reference level and a level 2 dB above the bottom and 2 dB below the top of the other available measurement ranges are also measured.
The measurements on the reference range is repeated with SPL results, if possible
Test signal: 4 kHz sine wave.

Reference Value (dB)	Measured Value (dB)	Tol. Value (dB)	Error Value (dB)	Error Code
Measured at 4 kHz				
Full scale setting: 130dB				
The following measurements are LEQ measurements				
114.0	114.0	0.7	0.0	P
119.0	119.0	0.7	0.0	P
124.0	124.0	0.7	0.0	P
129.0	129.0	0.7	0.0	P
131.0	131.0	0.7	0.0	P
132.0	132.0	0.7	0.0	P
133.0	133.0	0.7	0.0	P
134.0	134.0	0.7	0.0	P
135.0	135.0	0.7	0.0	P
136.0	136.0	0.7	0.0	P
137.0	137.0	0.7	0.0	P
114.0	114.0	0.7	0.0	P
109.0	109.0	0.7	0.0	P
104.0	104.0	0.7	0.0	P
99.0	99.0	0.7	0.0	P
94.0	94.0	0.7	0.0	P
89.0	89.0	0.7	0.0	P
84.0	84.0	0.7	0.0	P
79.0	79.0	0.7	0.0	P
74.0	74.0	0.7	0.0	P
69.0	69.0	0.7	0.0	P
64.0	64.0	0.7	0.0	P
59.0	59.0	0.7	0.0	P
54.0	54.0	0.7	0.0	P
49.0	49.0	0.7	0.0	P
46.0	46.0	0.7	0.0	P
45.0	45.0	0.7	0.0	P
44.0	44.0	0.7	0.0	P
43.0	43.0	0.7	0.0	P
42.0	42.1	0.7	0.1	P
41.0	41.0	0.7	0.0	P
40.0	40.0	0.7	0.0	P
Full scale setting: 130dB				
114.0	114.0	0.7	0.0	P
135.0	135.0	0.7	0.0	P
40.0	40.0	0.7	0.0	P
Full scale setting: 130dB				
The following measurements are SPL measurements				
114.0	114.0	0.7	0.0	P
119.0	119.0	1.0	0.0	P
124.0	124.0	1.0	0.0	P
129.0	129.0	1.0	0.0	P
131.0	131.0	1.0	0.0	P
132.0	132.0	1.0	0.0	P

Level Linearity Test - BS 7580, Clause 5.5.3

Reference Value (dB)	Measured Value (dB)	Tol. Value (dB)	Error Value (dB)	Error Code
133.0	133.0	1.0	0.0	P
134.0	134.0	1.0	0.0	P
135.0	135.0	1.0	0.0	P
136.0	136.0	1.0	0.0	P
137.0	137.0	1.0	0.0	P
114.0	114.0	0.7	0.0	P
109.0	109.0	0.7	0.0	P
104.0	104.0	0.7	0.0	P
99.0	99.0	0.7	0.0	P
94.0	94.0	0.7	0.0	P
89.0	89.0	0.7	0.0	P
84.0	84.0	0.7	0.0	P
79.0	79.0	0.7	0.0	P
74.0	74.0	0.7	0.0	P
69.0	69.0	0.7	0.0	P
64.0	64.0	0.7	0.0	P
59.0	59.0	0.7	0.0	P
54.0	54.0	0.7	0.0	P
49.0	49.0	0.7	0.0	P
46.0	46.0	0.7	0.0	P
45.0	45.0	0.7	0.0	P
44.0	44.0	0.7	0.0	P
43.0	43.0	0.7	0.0	P
42.0	42.0	0.7	0.0	P
41.0	41.0	0.7	0.0	P
40.0	40.0	0.7	0.0	P

Test Passed

Frequency weightings: A Network - BS 7580 Clause 5.5.4

The SLM is set to its reference range and tested relative to 1k Hz at the reference SPL. All available networks are tested. Tolerances given here are for information only and relate to complete instrument, see test §5.5.4. for complete instrument data to which these tolerances relate.

Freq (Hz)	Ref (dB)	Meas. Value (dB)	Tolerance HiLim (dB)	Tolerance LoLim (dB)	Result Value (dB)	Code	
31.6	114.0	113.8	1.5	-1.5	-0.2	P	Adjusted 25.4dB **
63.1	114.0	113.9	1.5	-1.5	-0.1	P	Adjusted 12.2dB **
125.9	114.0	113.9	1.0	-1.0	-0.1	P	
251.2	114.0	113.9	1.0	-1.0	-0.1	P	
501.2	114.0	113.9	1.0	-1.0	-0.1	P	
1000.0	114.0	114.0	1.0	-1.0	0.0	P	
1995.3	114.0	113.9	1.0	-1.0	-0.1	P	
3981.1	114.0	113.8	1.0	-1.0	-0.2	P	
7943.3	114.0	113.9	1.5	-3.0	-0.1	P	
12589.3	114.0	113.9	3.0	-6.0	-0.1	P	

** indicates that level is adjusted because of limited dynamic range.

Test Passed

Frequency weightings: C Network - BS 7580 Clause 5.5.4

The SLM is set to its reference range and tested relative to 1k Hz at the reference SPL. All available networks are tested. Tolerances given here are for information only and relate to complete instrument, see test §5.5.4. for complete instrument data to which these tolerances relate.

Freq (Hz)	Ref (dB)	Meas. Value (dB)	Tolerance HiLim (dB)	Tolerance LoLim (dB)	Result Value (dB)	Code
31.6	114.0	113.9	1.5	-1.5	-0.1	P
63.1	114.0	113.9	1.5	-1.5	-0.1	P
125.9	114.0	113.9	1.0	-1.0	-0.1	P
251.2	114.0	113.9	1.0	-1.0	-0.1	P
501.2	114.0	114.0	1.0	-1.0	0.0	P
1000.0	114.0	114.0	1.0	-1.0	0.0	P
1995.3	114.0	113.9	1.0	-1.0	-0.1	P
3981.1	114.0	113.8	1.0	-1.0	-0.2	P
7943.3	114.0	113.9	1.5	-3.0	-0.1	P
12589.3	114.0	113.9	3.0	-6.0	-0.1	P

Test Passed

Frequency weightings: Z Network - BS 7580 Clause 5.5.4

The SLM is set to its reference range and tested relative to 1k Hz at the reference SPL. All available networks are tested. Tolerances given here are for information only and relate to complete instrument, see test §5.5.4. for complete instrument data to which these tolerances relate.

Freq (Hz)	Ref (dB)	Meas. Value (dB)	Tolerance HiLim (dB)	Tolerance LoLim (dB)	Result Value (dB)	Code
31.6	114.0	113.9	1.5	-1.5	-0.1	P
63.1	114.0	113.9	1.5	-1.5	-0.1	P
125.9	114.0	113.9	1.0	-1.0	-0.1	P
251.2	114.0	113.9	1.0	-1.0	-0.1	P
501.2	114.0	113.9	1.0	-1.0	-0.1	P
1000.0	114.0	114.0	1.0	-1.0	0.0	P
1995.3	114.0	113.9	1.0	-1.0	-0.1	P
3981.1	114.0	113.9	1.0	-1.0	-0.1	P
7943.3	114.0	113.9	1.5	-3.0	-0.1	P
12589.3	114.0	113.9	3.0	-6.0	-0.1	P

Test Passed

Time weightings F and S - BS 7580 Clause 5.5.5

A continuous sine wave is applied to the SLM and adjusted to give an indication 4 dB below upper limit of the primary indicator range. Then onset transient characteristics are tested using a single sine wave burst with an amplitude equal to the continuous signal and a duration of T(ms).
Test signal: Single Sine Wave Burst of 2 kHz.

Time Constant	Burst Duration (ms)	Ref. Value (dB)	Measured Value (dB)	Tolerance Value (dB)	Result Value (dB)	
Fast	200	112.0	112.0	1.0	0.0	P
Slow	500	108.9	108.9	1.0	0.0	P

Test Passed

Peak response - BS 7580 Clause 5.5.6

Rectangular wave pulses are used to test the peak response. The response of a 100 micro second pulse shall not differ from the response of a 10 milliseconds pulse by more than 2dB.

Pulse Duration	Pulse Polarity	Ref. Value (dB)	Meas. Value (dB)	Tolerance Value (dB)	Error values Abs. (dB)	Error values Rel. (dB)	Result Code
10ms	+	116.0	116.6		0.6		P
0.1ms	+	116.0	115.7	2.0	-0.3	-0.9	P
10ms	-	116.0	116.6		0.6		P
0.1ms	-	116.0	115.6	2.0	-0.4	-1.0	P

The results have been compensated for the impulse response of
the C-weighting network.
Test Passed

RMS accuracy - BS 7580 Clause 5.5.7

The instrument is set to time constant Slow. A continuous sine wave (2kHz) is applied to the SLM and adjusted to give an indication 2 dB below upper limit of the primary indicator range
The signal is replaced by a sequence of tone bursts (CF=3) with a repetition rate of 40Hz.

	Crest Factor	Ref. Value (dB)	Meas. Value (dB)	Tolerance norm (dB)	Result Value (dB)	
F	3	115.0	115.2	0.5	0.2	P
S	3	115.0	115.0	0.5	0.0	P

Test Passed

Time weighting I - BS 7580 Clause 5.5.8

A continuous sine wave (2 kHz) is applied to the SLM and adjusted to give an indication at the upper limit of the primary indicator range. The onset transient characteristics are tested. First, a single sine wave burst with the amplitude equal to the continuous signal and the duration of 5 ms is used. Then, the same burst is repeated with a frequency of 100 Hz.

Burst type	Reference Value (dB)	Measured Value (dB)	Tolerance norm (dB)	Result Value (dB)	
5 ms single burst	108.2	107.9	2.0	-0.3	P
100Hz repeated	114.3	113.9	1.0	-0.4	P

Test Passed

Integrating Test : Time averaging - BS 7580 Clause 5.5.9

The SLM is set to the reference range. The signal generator is adjusted to give a 4 kHz sine wave with an rms level 30dB below the top of the Linearity range. The sine wave is replaced by a sequence of tone burst with the same frequency and the same rms level. For type 1 and 0 instruments, the burst duty factor (the distance between each burst) is increased, while the amplitude is increased to keep the same equivalent rms level. 1 minute, 6 minutes and 1 hour respectively.
Test signal: Continuous sine wave burst of 4kHz

Burst Duration (ms)	Ref. Value (dB)	Tolerance norm (dB)	Meas. Value (dB)	Error (LeqA) (dB)	
1/10^3	107.0	1.0	107.0	0.0	P
1/10^4	97.0	1.0	97.0	0.0	P

Test Passed

Integrating Test : Pulse range - BS 7580 Clause 5.5.10

Pulse handling is tested on the reference range using a 10 ms tone burst (of 4 kHz) during an integration period of 10 seconds superimposed on a low level background signal. The resulting A-weighted Leq shall correspond to table II of BS EN IEC 60804. The test is repeated on the upper end of the linearity range.

Burst Duration (ms)	Ref. Value (dB)	Measured Value (dB)	Tolerance Norm (dB)	Result Value (dB)	
10	52.0	52.0	1.7	0.0	P
10	102.0	102.0	1.7	0.0	P

Test Passed

Integrating Test : Sound exposure level - BS 7580 Clause 5.5.11

Pulse handling is tested on the reference range using a 10 ms tone burst (of 4 kHz) during an integration period of 10 seconds. The A-weighted SEL of the burst shall correspond to table II of BS EN 60804. The test is repeated on the lower end of the pulse range.

Burst Duration (ms)	Ref. Value (dB)	Measured Value (dB)	Tolerance Norm (dB)	Result Value (dB)	
10	62.0	62.0	1.7	0.0	P
10	112.0	112.0	1.7	0.0	P

Test Passed

Overload SPL Test - BS 7580 Clause 5.5.12

The SLM is set to reference range. A continuous tone burst is applied and adjusted until overload occurs. Then signal is reduced to give an on-scale indication. The level is further reduced 3 dB and the SLM shall indicate correctly within the tolerances given in table XIII of BS EN 60651.

	Ref. Value (dB)	Measured Value (dB)	Tolerance Norm (dB)	Result Value (dB)	
SPL CF3	130.6 -3	127.6	1.0	0.0	P

Overload occurred at: 131.6dB RMS

Test Passed

Overload Leq Test - BS 7580 Clause 5.5.12

The SLM is set to Leq. A 1 ms pulse of 4 kHz on a low level background is applied and adjusted until overload occurs. Then the level is reduced 1 dB. A single tone burst is then applied and the Leq,10s measured. The result shall be within the tolerances given in table II of BS EN IEC 60804.

	Ref. Value (dB)	Measured Value (dB)	Tolerance Norm (dB)	Result Value (dB)	
LEQ 1ms	96.9	96.9	2.2	0.0	P

Overload occurred approximately at: 140.9 dB (peak level)

Test Passed

Acoustic tests - BS 7580 Clause 5.4 and 5.6

```
The sound level meter was tested at 125 Hz. (§5.6.2)
Reference level:                          90.1 dB
Ambient corrections:                           dB
Pressure to free field correction:        0.00 dB
Case reflections:                              dB
Linearity error:                               dB
Weighting correction:                     0.17 dB
Windscreen corrections:                        dB
Notional level:                          89.93 dB
Indicated level:                          90.0 dB
Tolerance:                               +/- 1 dB
Error:                                    0.07 dB
The sound level meter was tested at 1k Hz. (§5.6.2)
Reference level:                          90.1 dB
Ambient corrections:                           dB
Pressure to free field correction:        0.00 dB
Case reflections:                              dB
Linearity error:                               dB
Weighting correction:                     0.00 dB
Windscreen corrections:                        dB
Notional level:                          90.10 dB
Indicated level:                          90.0 dB
Tolerance:                               +/- 1 dB
Error:                                   -0.10 dB
The sound level meter was tested at 4k Hz. (§5.6.2)
Reference level:                          90.1 dB
Ambient corrections:                           dB
Pressure to free field correction:        1.10 dB
Case reflections:                              dB
Linearity error:                               dB
Weighting correction:                     0.82 dB
Windscreen corrections:                        dB
Notional level:                          88.18 dB
Indicated level:                          87.6 dB
Tolerance:                               +/- 1 dB
Error:                                   -0.58 dB
The sound level meter was tested at 8k Hz. (§5.6.2)
Reference level:                          90.1 dB
Ambient corrections:                           dB
Pressure to free field correction:        3.50 dB
Case reflections:                              dB
Linearity error:                               dB
Weighting correction:                     3.01 dB
Windscreen corrections:                        dB
Notional level:                          83.59 dB
Indicated level:                          82.8 dB
Tolerance:                          +1.5; -3 dB
Error:                                   -0.79 dB
The measurement was performed using an electrostatic actuator method.
Response: Free field
Test Passed
```

Summation of acoustic tests - BS 7580 Clause 5.5.4

The microphone data are measured using electrostatic actuator.

SLM: A-Weighted results

Freq. (Hz)	SLM (dB)	Mic. (dB)	CR. (dB)	WS. (dB)	Tol. (dB)	Dev. (dB)
31.5	-0.2	0.0			+-1.5	-0.2
63	-0.1	0.0			+-1.5	-0.1
125	-0.1	0.0			+-1.0	-0.1
250	-0.1	0.0			+-1.0	-0.1
500	-0.1	0.0			+-1.0	-0.1
1 k	0.0	-0.1			+-1.0	-0.1
2 k	-0.1	-0.2			+-1.0	-0.3
4 k	-0.2	-0.5			+-1.0	-0.7
8 k	-0.1	-0.8			+1.5,-3	-0.9
12.5 k	-0.1	-1.5			+3,-6	-1.6

SLM: C-Weighted results

Freq. (Hz)	SLM (dB)	Mic. (dB)	CR. (dB)	WS. (dB)	Tol. (dB)	Dev. (dB)
31.5	-0.1	0.0			+-1.5	-0.1
63	-0.1	0.0			+-1.5	-0.1
125	-0.1	0.0			+-1.0	-0.1
250	-0.1	0.0			+-1.0	-0.1
500	0.0	0.0			+-1.0	0.0
1 k	0.0	-0.1			+-1.0	-0.1
2 k	-0.1	-0.2			+-1.0	-0.3
4 k	-0.2	-0.5			+-1.0	-0.7
8 k	-0.1	-0.8			+1.5,-3	-0.9
12.5 k	-0.1	-1.5			+3,-6	-1.6

SLM: Z-Weighted results

Freq. (Hz)	SLM (dB)	Mic. (dB)	CR. (dB)	WS. (dB)	Tol. (dB)	Dev. (dB)
31.5	-0.1	0.0			+-1.5	-0.1
63	-0.1	0.0			+-1.5	-0.1
125	-0.1	0.0			+-1.0	-0.1
250	-0.1	0.0			+-1.0	-0.1
500	-0.1	0.0			+-1.0	-0.1
1 k	0.0	-0.1			+-1.0	-0.1
2 k	-0.1	-0.2			+-1.0	-0.3
4 k	-0.1	-0.5			+-1.0	-0.6
8 k	-0.1	-0.8			+1.5,-3	-0.9
12.5 k	-0.1	-1.5			+3,-6	-1.6

Test Passed

The overall frequency response of the sound level meter and microphone response has shown to conform with the requirements in §6 of the BSEN 60651 and §5.5.4 in BS 7580 Part 1.

*** End of results ***